



FileMaker Training Series

FileMaker 14

Basics



FileMaker[®]
An Apple Subsidiary

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Preface



PREFACE

Preface

Master the essentials of FileMaker 14

Congratulations on selecting the FileMaker Training Series! The *FileMaker Training Series: Basics* and the *FileMaker Training Series: Advanced* make up the official curriculum for learning how to use FileMaker software to build professional solutions.

The **FileMaker Training Series: Basics** focuses on the features and benefits of the FileMaker Platform with special attention to the newest version, FileMaker 14. You will learn how to build a sample FileMaker solution from start to finish.

The **FileMaker Training Series: Advanced** is for intermediate to advanced FileMaker developers, but anyone who creates FileMaker databases can benefit from it. It also serves as a stepping-stone to becoming a FileMaker 14 Certified Developer. *FileMaker Training Series: Advanced* is a separate purchase.

Necessary materials

The *FileMaker Training Series: Basics* training has activities to guide you through the FileMaker Platform. In order to follow along, make sure you have the following materials.

Software

Before you begin the training, you will need the following software:

FileMaker Pro 14 – download 30-day trial:

<http://www.filemaker.com/trial>

FileMaker Go 14 – free download from the App Store:

<http://www.filemaker.com/fmgo>

Activity Files

The activities in this training will use the following files:

- Contacts.fmp12
- Customers.xlsx
- Assets.xlsx

Solution File

This is an example of the finished solution being built in this training:

- Equipment Rentals.fmp12

To download the activity and solution files, visit:

http://www.filemaker.com/r/fts_basics_14_activities

Introduction



Introduction

In this Series

What if you could streamline your business by creating custom solutions that transform the way you and your team work? Instead of relying on spreadsheets, paper forms, or multiple applications to get your work done, connect your team together with interactive screens, reports, and dashboards that deliver all the information they need in one place. The FileMaker Platform puts you in control, providing an easy way to create database solutions that meet the specific needs of your business.

People and organizations all over the world rely on the FileMaker Platform to manage, analyze, and share important information. The software is available in over 60 countries in 17 languages and is used by all types of organizations, including government, education, healthcare, retail, manufacturing, real estate, legal, and more.

The FileMaker Platform is a line of products that work together to streamline your business. You can easily create solutions to manage and share information with your team on Mac, Windows, mobile devices, and the web.

FileMaker databases are generally referred to as “solutions”, because they bring together many software elements to solve business problems. Solutions built with the award-winning FileMaker Platform are used to streamline a wide range of functions like project management, asset management, invoicing and billing, and customer relationship management (CRM).

FileMaker Training Series: Basics for FileMaker 14

The training materials available for the FileMaker Platform include:

- The **Getting Started Tour** in FileMaker Pro and FileMaker Go, which takes you through the key features so you can start to build and use a solution immediately.
- The **FileMaker Training Series: Basics**, which builds on the **Getting Started Tour** and introduces how you can use the FileMaker Platform to create and deploy custom data management solutions.
- The **FileMaker Training Series: Advanced**, which provides in-depth coverage of FileMaker development practices and techniques in preparation for the FileMaker 14 Certification Exam.

The *FileMaker Training Series: Basics* focuses on the features and benefits of the FileMaker Platform with special attention to the newest version, FileMaker 14. For simplicity, "FileMaker" is used throughout the training except in cases where a feature is specific to FileMaker 14.

You will learn the capabilities of the two key products for creating solutions—FileMaker Pro and FileMaker Pro Advanced. While FileMaker Pro Advanced includes all the same features as FileMaker Pro, it also provides a suite of advanced development and customization tools. For simplicity, "FileMaker Pro" is used as a general term when referring to the software used to create solutions.

FileMaker Training Series: Basics assumes that you have FileMaker Pro installed on your Mac or Windows computer and FileMaker Go installed on your iOS device. Activities are included in the training that require you to use both products.

FileMaker Training Series: Basics for FileMaker 14

The *FileMaker Training Series: Basics* is organized as follows:

- In Lessons 1 - 2, you will be introduced to:
 - The FileMaker Platform
 - FileMaker Starter Solutions
- In Lessons 3 - 5, you will learn about using a FileMaker solution and how to:
 - Navigate a FileMaker solution
 - View and modify data in a solution
 - Find and sort data in a solution
- In Lesson 6, you will learn about user-centered design including:
 - Planning a solution to solve the right problems
 - A sample scenario used for the rest of the lessons
- In Lessons 7 - 8, you will learn about data and how to:
 - Import data into a FileMaker solution
 - Create tables, fields, and relationships for your data
- In Lessons 9 - 13, you will learn about user interface design and how to:
 - Use themes, styles, guides, and other FileMaker design tools
 - Create interfaces for iOS devices
 - Create efficient interfaces for the user

FileMaker Training Series: Basics for FileMaker 14

- In Lessons 14 - 19, you will learn about powerful tools in the FileMaker Platform including:
 - Calculations, Scripting, and Reporting
 - Integration with other business systems
 - Security
 - Sharing and deployment of your solution to other users

We appreciate your interest in learning how FileMaker can solve your business challenges. We support you in your training process and encourage you to visit the FileMaker Community at <https://community.filemaker.com/>, where you can post your questions and learn from other people's experience.

Lesson 1

FileMaker Platform Overview



Lesson 1: FileMaker Platform Overview

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Objectives: FileMaker Platform

After this lesson, you will be able to:

- Identify the four products of the FileMaker Platform.
- Identify the requirements for building, accessing, and hosting FileMaker solutions.
- Compare and contrast FileMaker Pro and FileMaker Go.
- List the additional features in FileMaker Pro Advanced.
- Describe real-world uses of FileMaker solutions.

The FileMaker 14 Platform is a set of tools and technologies that enable you to create, deploy, and manage custom business solutions, as well as modify them as your organizational needs change. You can create solutions that run on iPad, iPhone, Mac, Windows, and the web.

FileMaker Training Series: Basics for FileMaker 14

Solutions that are well-designed allow easy collection and sharing of data in various locations, such as customer information at a sales event and safety checklists at a worksite. Imagine, for example, a safety inspector collecting data in the field with FileMaker Go for iPad—taking pictures, entering notes—and uploading this data to FileMaker Server so that FileMaker Pro users in the office can see and use the data right away. The products that make up the FileMaker Platform work together to let users see and interact with the same information in real time.

In this lesson, you will learn about the different products in the FileMaker Platform, what they do, and how they work together.

LESSON 1

Section 1: What are FileMaker Solutions?

A FileMaker solution is made up of one or more files that resolve business issues and improve data management. Well-designed solutions that are customized to meet the specific needs of a business help employees do their jobs more quickly and easily, reduce operating costs, and enhance customer satisfaction.

A custom FileMaker solution may contain the following components:

Data

Almost every application today—an online catalog, an address book, a calendar—is driven by a database engine. All of these applications store and retrieve a variety of data in a structured format.

A database contains two parts: a data structure and the data that lives within that structure. FileMaker has a database at its core for creating structure like tables, fields, and relationships. This provides the foundation for users to interact with the data stored in the structure.

Interface

In a solution, the interface provides users with a way to view and interact with the data. A well-designed solution will incorporate business rules for what data the user can view, find, and modify, and how they do so. The interface revolves mostly around layouts and layout objects.

Solution Logic

Solution logic adds automation to make users more productive. The two main tools FileMaker Pro provides for automating solution logic are calculations and scripting. Calculations provide access to complex, calculated data. Scripts allow users to complete tasks quickly and efficiently by automating certain portions of the business process or by guiding them through the process. Both scripts and calculations increase data integrity by standardizing business processes.

Reporting

FileMaker Pro provides step-by-step reporting tools, including eye-catching charts, to help analyze and summarize data in meaningful ways. You can easily create and email reports in Excel or PDF format to share with others. FileMaker Pro makes this possible by combining data, interface, and solution logic.

Integration

Integrating a FileMaker solution with other technologies can improve the efficiency of your workgroup and extend the capabilities of a solution. The FileMaker Platform allows you to import and export to file formats like Excel and comma-separated text, work with data in ODBC compatible systems like SQL Server and MySQL, display web pages on your layouts, and much more.

Security

Security is a critical component of any modern system. FileMaker Pro has built-in tools that allows you to manage the security of your FileMaker solution. You can restrict access to entire FileMaker files as well as to individual tables, records, fields, layouts, scripts, and so on.

Deployment

Providing access to a solution by one or more users is possible through FileMaker deployment capabilities. FileMaker solutions are often hosted on FileMaker Server, giving consistent access to multiple simultaneous users, as well as providing other benefits like automated backups and secure data connections.

The FileMaker Advantage

The FileMaker Platform combines data structure, interface, scripting, and calculations to create a cohesive developer and user experience. Since these tools are available in a single platform, employing a separate database administrator, UI designer, and programmer is not always necessary to create a business solution. With the help of the tools and templates provided within FileMaker products, a single knowledge worker with a solid understanding of the FileMaker Platform can create a custom solution for their department or organization.

FileMaker solutions can often be created in days or weeks rather than months or years. Modifications and feature additions can be done in minutes or hours.

You can start small and grow your solution over time. Keep in mind that building more complex solutions requires planning, preparation, and knowledge of the product features. The *FileMaker Training Series* provides instruction on these steps.

LESSON 1

Section 2: Product Line

How Products Work Together

You start with FileMaker Pro on a Windows or Mac computer to create your custom business solution. You may choose to use FileMaker Pro Advanced if you need additional development and customization tools.

Then, to run your solution on iPad or iPhone, use the free FileMaker Go app which is available on the App Store.

For a small team with occasional access, FileMaker Pro can share solutions with up to 5 other FileMaker Pro or FileMaker Go users (shown in Figure 1).

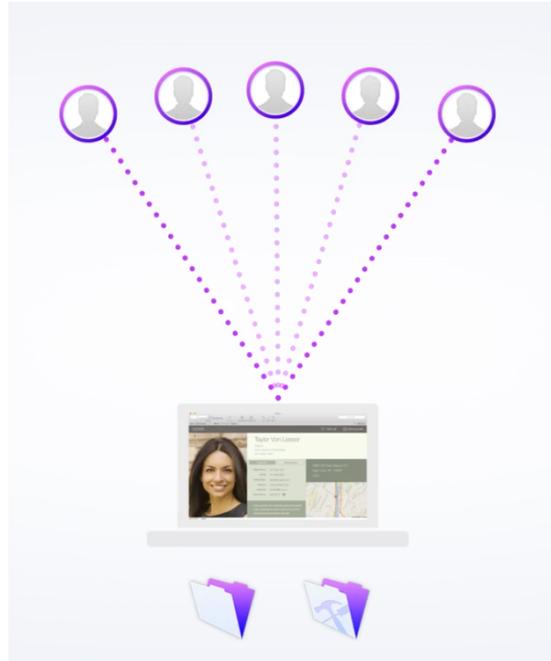


FIGURE 1

In most cases, however, FileMaker Server offers a better deployment option. It permits sharing with many more users, runs on an independent machine, and promotes peace of mind through automatic backup schedules. Security options include installing a third party SSL certificate to provide secure connections between FileMaker Server and FileMaker Pro, FileMaker Go, and FileMaker WebDirect clients. FileMaker Server also includes other robust features, such as the ability to access your solution from a web browser, using FileMaker WebDirect or Custom Web Publishing technologies (Figure 2).

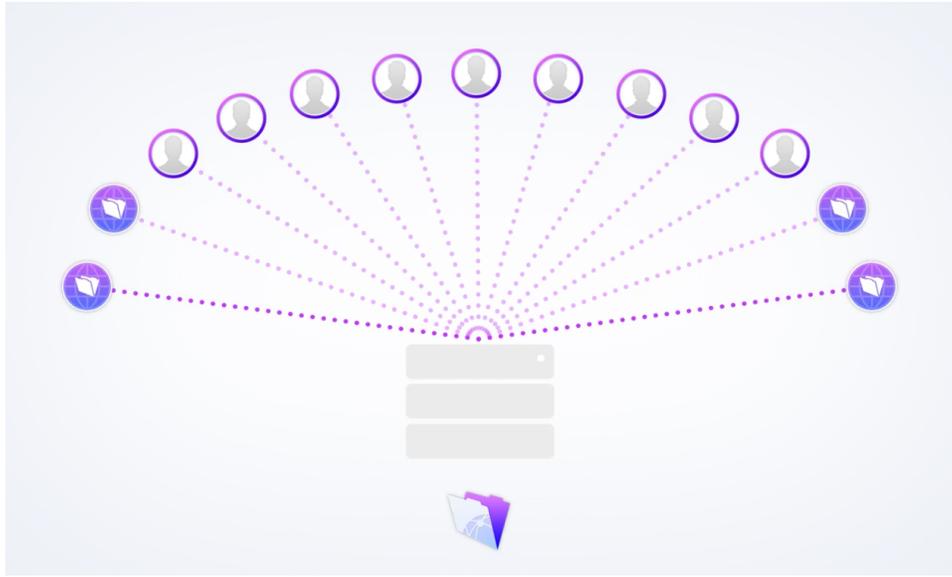


FIGURE 2

Knowing how users will connect to your solution helps determine what to purchase. Users with a paid license of FileMaker Pro on Windows or Mac can connect to FileMaker Server for no additional cost.

FileMaker Server has been tested for 250 simultaneous connections using FileMaker Pro and FileMaker Pro Advanced. Theoretically, the number of connections has no restrictions and is limited only by hardware, database design, and operating system.

Users with web browsers, or users running FileMaker Go on iPad and iPhone, require paid connections to FileMaker Server. These paid connections are called "concurrent connections."

For example, a team with several members connects to FileMaker Server using iPad, iPhone, or a web browser throughout the day. At various times, there are different numbers of users connected (as shown in Figure 3). The number of concurrent connections needed is determined by the maximum number of people connected at any one time using iPad, iPhone, or a web browser.

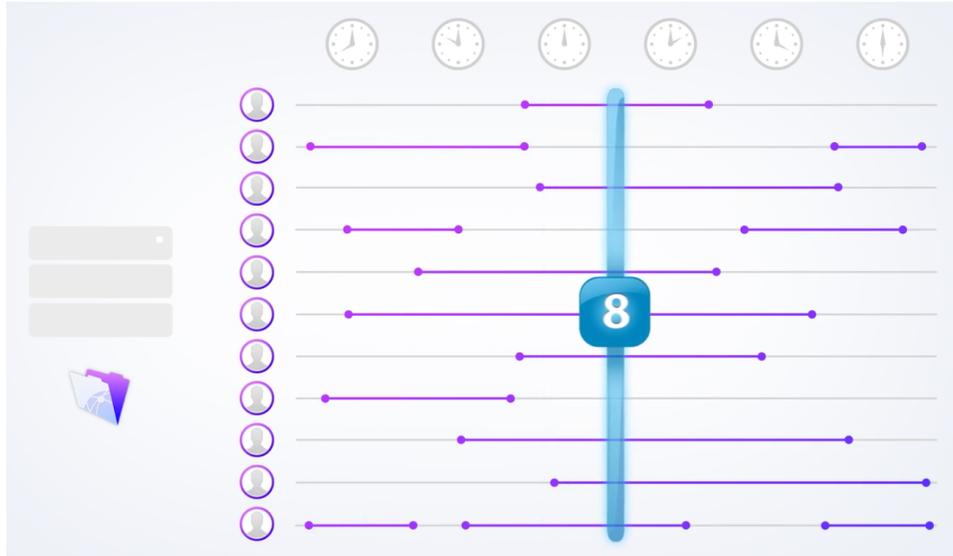


FIGURE 3

FileMaker Server comes with one concurrent connection so you can test your solution using iPad, iPhone, or a web browser. You can purchase additional concurrent connections in groups of 5.

For example, if the maximum number of people connected at any one time using iPad, iPhone, or a web browser is 8, you will need to purchase two groups of 5 concurrent connections to equal 10 connections. As your team grows, you can add more concurrent connections in groups of 5. Up to 100 concurrent connections can be used with FileMaker WebDirect and FileMaker Go.

In summary:

- Use FileMaker Pro or FileMaker Pro Advanced to create and run solutions on Windows or Mac, purchasing a FileMaker Pro license for each Windows and Mac user.
- Use FileMaker Go to run solutions on iPad or iPhone, downloading the free FileMaker Go app for each iPad and iPhone user.

- When using FileMaker Server to share your solution with larger teams and to enable web browser connections, purchase licenses of FileMaker Pro for all your Windows and Mac users as well as the appropriate number of concurrent connections for your iPad, iPhone, and web browser users.

Product Descriptions in Detail

While the products in the FileMaker Platform are designed to work together, they each have their own roles and capabilities. For the latest technical specs and hardware requirements, visit the FileMaker website.

FileMaker Pro 14

FileMaker Pro is desktop software for Windows and Mac that allows you to design and build custom solutions, while also using ready-made solutions built by others.

FileMaker Pro provides tools to define data structure, create layouts to view data, and share data with up to five other network connected users, which is called “peer-to-peer” sharing. (The “peer-to-peer” data sharing works well for lightweight uses, but FileMaker Server is the best tool for sharing FileMaker solutions.)

FileMaker Pro 14 Advanced

Like FileMaker Pro, FileMaker Pro Advanced is also desktop software for Windows and Mac, offering all the same features plus additional programming and development tools, including script debugging and the ability to create custom menus and database design reports.

The Script Debugger and Data Viewer are essential tools for troubleshooting solution logic. The Script Debugger allows developers to walk through scripts step by step for testing purposes. The Data Viewer can be used to monitor fields and variables while scripts are running and write and test calculations before using them for real business purposes.

Developers can customize the behavior of the application itself using Custom Menus and Custom Functions. Custom Menus let FileMaker developers take control of the organization and behavior of the menubar, and Custom Functions let FileMaker developers create their own functions to use in the FileMaker calculation dialog.

FileMaker Pro Advanced also contains tools for creating a Database Design Report (DDR), which documents the internal structure of a FileMaker solution. FileMaker Pro Advanced is also necessary in order to enable features like file encryption and kiosk mode for your solution.

The additional tools in FileMaker Pro Advanced are an essential part of a developer's toolkit, making it a must-have product for those who will be creating or maintaining solutions.

FileMaker Go 14

The FileMaker Go app allows users to access FileMaker solutions on iOS devices, including iPad, iPad mini, iPad Air, iPhone, and iPod touch. The app provides access to hosted (online) or locally stored (offline) FileMaker solutions.

For FileMaker solutions that are hosted, the iOS device must be connected to a network via Wi-Fi or a cellular connection to access the solution. Similar to FileMaker Pro, data entered while working on a mobile device will be immediately available to all other connected users.

FileMaker Go can also access a FileMaker solution stored locally on the device for offline use. By using FileMaker scripting or a commercial solution, the offline data can later be synchronized with a hosted solution for sharing among many users.

FileMaker Server 14

FileMaker Server software acts as a server for hosting FileMaker solutions. Hosted solutions can be used by hundreds of people at the same time with the data shared securely between the server and users. FileMaker Server can also allow access to FileMaker solutions via FileMaker WebDirect, which provides access through a user's web browser.

FileMaker Server can:

- Run scheduled, automated backups of database files
- Log usage and performance statistics
- Execute server-side scripts, including FileMaker scripts and system-level scripts (including Windows batch, Perl, VBScript, and AppleScript)
- Provide secure data transfer over networks
- Deploy a solution to anyone with a compatible web browser, without using web authoring tools or other technologies, via FileMaker WebDirect

FileMaker Server also includes the FileMaker API for PHP and XML Custom Web Publishing (CWP). Developers who are skilled in those technologies can use this API to build dynamic websites that interact with FileMaker solutions.

LESSON 1

Section 3: FileMaker Version Compatibility

The FileMaker 14 Platform uses a specific file format that has been available since FileMaker 12. Files created in this format have the extension of **.fmp12**. For users of FileMaker versions prior to 12, it will be necessary to convert older file formats to the new **.fmp12** format before using FileMaker 14.

More information on converting to FileMaker 14 can be found here:

<http://www.filemaker.com/products/filemaker-pro/conversion.html>

LESSON 1

Section 4: Accessing a Solution

When building a FileMaker solution, it helps to keep in mind how it will be accessed. A single FileMaker solution can provide different functionality based on the platform from which it is accessed. For example, people using the same solution may use:

- FileMaker Pro as a robust way for office employees to create, edit, and review orders
- FileMaker Go as a mobile way for warehouse employees to change the status of an order, get a signature from the recipient, and email the client a receipt of the order
- FileMaker WebDirect as an ad-hoc way for clients to check the status of their order using a web browser

FileMaker Pro has the flexibility and power for you to build layouts for all platforms in one solution. Following are the benefits of each product and platform:

FileMaker Pro

As a native application on Windows and Mac, FileMaker Pro offers ideal features for office work, such as the processing power of a desktop machine, the efficiency of keyboard shortcuts, and the ability to view multiple windows at once. Layouts designed for a full-sized monitor can offer an immersive experience and a more encompassing view of the data.

FileMaker Go

FileMaker Go benefits from being on an iOS device, making your data more portable. It also takes advantage of some device specific features:

- Take a photo or record a video with the built-in camera and store it in a FileMaker solution
- Enter or find data by using the camera as a bar code scanner
- Dial phone numbers stored in a FileMaker solution
- Add location data (latitude and longitude) to records
- Capture signatures

FileMaker WebDirect

FileMaker WebDirect provides a rich user experience similar to using FileMaker Pro. It is ideal for enabling teams located in remote offices to share information easily. Use FileMaker WebDirect to securely collect information like status updates, surveys, feedback forms, and more from geographically dispersed colleagues and associates.

However, because FileMaker WebDirect has some differences in functionality compared to FileMaker Pro, it is better suited as a complementary client rather than a replacement client in many situations.

For a feature-by-feature comparison, please read the FileMaker WebDirect Guide:

https://fmhelp.filemaker.com/docs/14/en/fm14_webdirect_guide.pdf

LESSON 1

Section 5: Real-World Use Cases

FileMaker solutions are used to streamline a vast range of functions including: project management, asset management, invoicing and billing, catalog creation, customer relationship management (CRM), patient records management, film and video production, sales and advertising management, and customer service.

The FileMaker website showcases real-world examples of how people use FileMaker solutions around the world: <http://www.filemaker.com/solutions/customers/>

A few examples are highlighted below:

Increasing Sustainability with FileMaker Go

The FileMaker Platform allows Sea Breeze Farm — a grass-based animal farm known for their world-class winery, restaurant, charcuterie, butcher, and cheese shops — to go paperless. George Page, Sea Breeze Farm's owner, sees the use of the FileMaker Platform as one that will elevate his farm's overall efficiency, as well as profits.

For the dairy operation, FileMaker Go for iPad allows Page and his staff to understand the production levels of cows on the farm. For the cheese business, employees note which types of milk are used in making cheese rounds and identify how long each round has been aged. In the wine cellar, FileMaker Go for

iPad has replaced clipboards for entering alcohol levels, pH readings, sulfite additions, and historic data related to wine lots, while replacing paper notes.

FileMaker Go for iPad is reducing paper use and improving productivity among employees. The FileMaker Platform is also making it easier for Page to gain business insights through visual features such as charting. Page says, "FileMaker Pro helps me easily create custom business solutions for iPad. The systems we have now are pleasing to look at, as well as highly functional — and that means our employees genuinely want to use them."

Streamlining Work Orders with a FileMaker Solution

Construction and service company Market Refrigeration Specialists installs and maintains large refrigeration and HVAC systems for major retailers such as WalMart, Target, Whole Foods, Sprouts, Vons, and Albertsons. Using FileMaker Go for iPad, field technicians process work orders, time cards, and parts requests in real time, shrinking revenue cycles from two months to two weeks.

In the past, Market Refrigeration Specialists' field technicians had to fill out paper work orders in triplicate. Likewise, parts orders had to be written up and faxed. Now, with the new FileMaker solution, technicians can clearly view their daily assignments and work orders and travel to various client sites. Once they arrive at a destination, they can review client requirements and project parameters and get to work right away. Everything runs on FileMaker Server in the main office, so as orders are completed, data is instantly recorded in the central database for invoicing.

On a day-to-day basis, their FileMaker solution provides technicians with a simple, self-populating form for reporting refrigerant handling. This information must get to the Environmental Protection Agency within seven days or Market Refrigeration Specialists could face fines of up to \$10,000. But that's no longer a

challenge: simply by answering a few questions and hitting Submit on the iPad, technicians automatically transfer information to an EPA certification document.

Improving Efficiency and Communication with FileMaker Go

Musashino Corporation, based out of Koganei City in Tokyo, Japan, operates over 240 seminar events per year. To manage the seminars, Musashino developed a Seminar Progress Management solution on the FileMaker Platform.

Previously, Musashino managed all the events with paper and clipboards. With FileMaker Go for iPad, staff can now check their assigned tasks and help others with their tasks if delays occur. Previously, last minute changes would not get communicated effectively, but with the FileMaker solution, the data is up to date for all staff. The quality of work has improved and seminar operational efficiency has increased, enabling the staff to spend more time with customers.

Additionally, Musashino uses their FileMaker solution to complete in-house inspections of workplace environments. Similar to the events managed by Musashino, the inspections were previously completed with paper and pen. Now, FileMaker Go for iPad allows staff to review the itemized checklist and report their findings much faster than before. Noboru Koyama, President of Musashino, says “FileMaker is a great tool to create solutions quickly and implement them immediately and also to improve the solutions easily.”

Providing Medical Documentation via FileMaker Go

Henry Schein Dental is one of the largest worldwide providers of healthcare products and services to dentists, doctors, and veterinarians. Sales consultants are armed with a custom sales literature solution created in FileMaker Pro and running on FileMaker Go for iPad. The solution lets them search through

thumbnails, pull up pertinent literature, order a PDF or print version, and hand over personalized, "just-in-time" sales materials on the spot.

For sales consultants who do not yet have an iPad, Henry Schein Dental uses the FileMaker API for PHP to deliver the same custom sales literature solution via the web browser on their desktop or laptop computers. As a result, speed of customer communication and knowledge of the available sales tools have improved significantly.

On the back end, FileMaker Server tracks quantities of sales materials to determine exactly what needs to be printed, saving potentially tens of thousands of dollars previously wasted on overstocked, never-used brochures. Jon Baucom, Director of Marketing, and others on the marketing team can use FileMaker Pro on Windows and Mac computers to generate reports automatically and to chart inventory levels and popularity of specific pieces to continually improve and streamline the production process.

LESSON 1

Section 6: Getting Started Tour

It is recommended that you review the **Getting Started Tour** built into FileMaker Pro prior to proceeding with the rest of the *FileMaker Training Series: Basics*.

While the **Getting Started Tour** covers foundational information about FileMaker Pro, the *FileMaker Training Series: Basics* will cover those topics and many others in much more depth.

You can access the **Getting Started Tour** (shown in Figure 4) in FileMaker Pro upon opening it the first time or in the **Help** menu under **Product Documentation**.

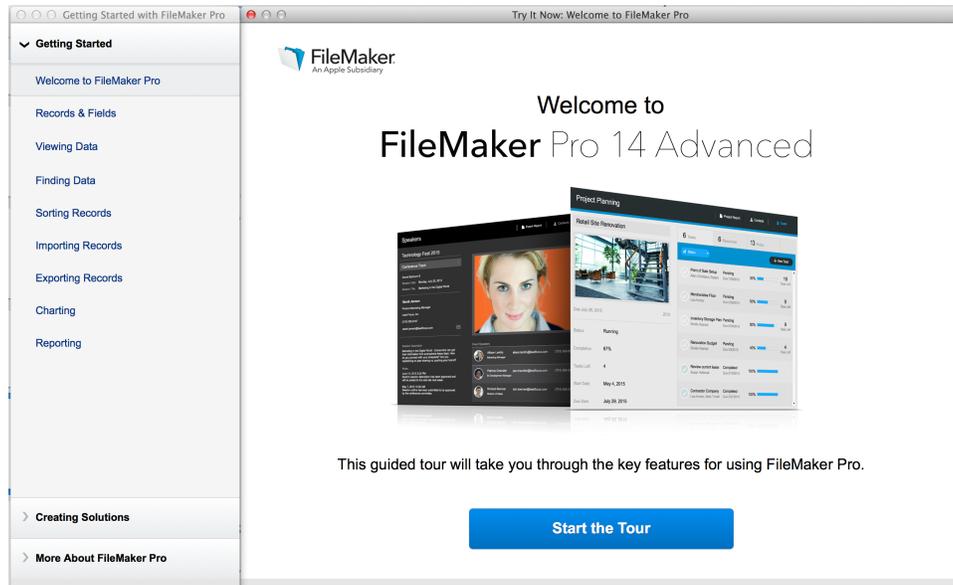


FIGURE 4

In the **Getting Started Tour**, you learn about:

FileMaker Training Series: Basics for FileMaker 14

- Creating and editing records
- Importing data from Excel
- Finding, sorting, and exporting data

You can access the **Welcome Tour** in FileMaker Go upon opening it the first time or by tapping on **Welcome Tour** in the **Options** screen, as shown in Figure 5.

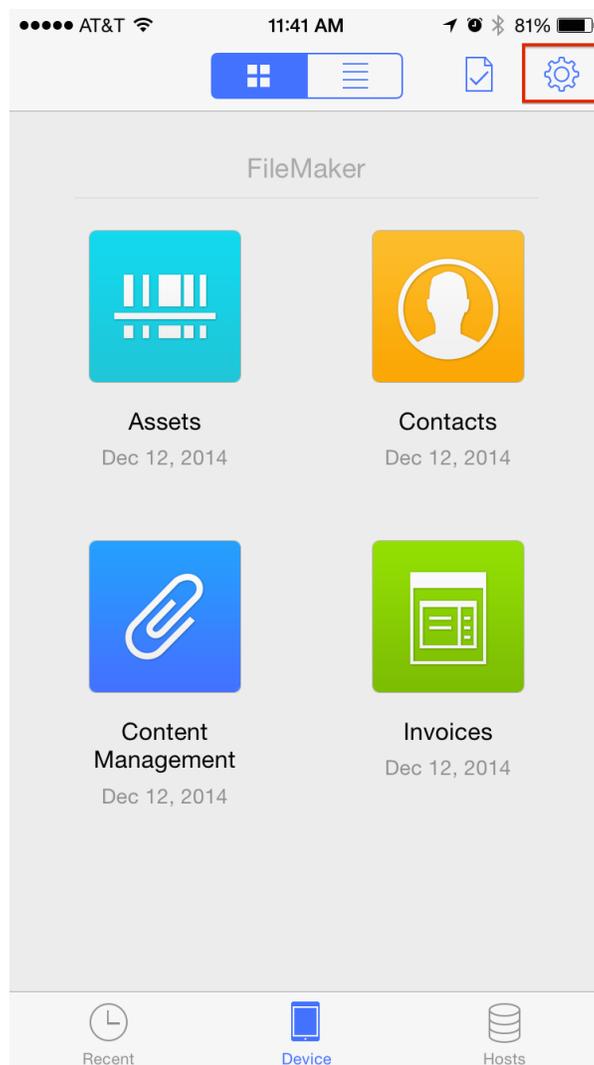


FIGURE 5

Lesson 1: Review Questions

1. Describe two real-world use cases of a FileMaker solution.
2. What is the recommended way to share a FileMaker solution with multiple users?
3. Explain the software and hardware you need to design and build a FileMaker solution.
4. When do you need to purchase concurrent connections?
5. Describe the two methods by which FileMaker Go can access a FileMaker solution.

Lesson 1: Review Answers

1. Musashino Corporation manages seminars, through a Seminar Progress Management solution on the FileMaker Platform. Staff can check their tasks and help others with their tasks. Market Refrigeration Specialists installs and maintains large refrigeration and HVAC systems. With FileMaker Go for iPad, field technicians process work orders, time cards, and parts requests.
2. The best way to share a FileMaker database with multiple users is by hosting the file on FileMaker Server.
3. In order to design and build a FileMaker solution, you need FileMaker Pro or FileMaker Pro Advanced running on a Mac or Windows computer.
4. You need to purchase concurrent connections for FileMaker Server when you have users accessing your solution from iPad, iPhone, or a web browser.
5. FileMaker Go can access FileMaker solutions that are stored locally on an iOS device, or it can access hosted solutions over Wi-Fi or a cellular network connection.

Lesson 2

Using Starter Solutions



Lesson 2: Using Starter Solutions

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Objectives

After this lesson, you will be able to:

- Determine when a Starter Solution best fits your needs.
- Understand why Starter Solutions are useful for desktop and mobile development.
- Create a file that is accessible on your iOS device through FileMaker Go.

There are three primary methods for creating a solution: beginning with a Starter Solution and modifying it to meet your needs, importing data from another source, and creating a solution from scratch.

This lesson will explain how to create a solution by using a Starter Solution.

FileMaker Pro comes with 16 built-in Starter Solutions, which are professionally designed templates customized for managing tasks on iPad, iPhone, desktop,

and the web. In minutes, you will be able to get started managing contacts, assets, content, invoices, and more. Plus, you can easily modify the Starter Solutions for your specific needs.

LESSON 2

Section 1: Choose a Starter Solution

Starter Solutions are fully built FileMaker solutions that allow users to manage many different types of information. They are also easily customizable by adding fields, rearranging layouts, and even copying or importing elements from a different Starter Solution.

To use a Starter Solution, simply select **New From Starter Solution...** (in the **File** menu). Select a solution, save it to your desktop, then explore the template by entering data.

The list below summarizes the features, the development skill level, and the data that can be stored for each of the Starter Solutions. Open and explore each of them to become acquainted with what each solution does—and how it works.

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STARTER SOLUTION	SKILL LEVEL	FEATURES
Assets	Beginner	Tracks office assets and other depreciable items. Fields include: asset category, serial number, and purchase date. Calculates depreciation using the straight-line method.
Contacts	Beginner	Manages complete contact information for all your business relationships, including multiple addresses, phone numbers, email address, and more.
Content Management	Beginner	Tracks different media files and relevant categorical and status information, as well as details about their revision history.
Expense Reports	Intermediate	Tracks and reports reimbursable expenses.
Inventory	Intermediate	Tracks inventory items, including category, value, and more. Also tracks stock transactions and company information.
Meetings	Intermediate	Monitors meeting minutes and summaries, as well as action items and responsible parties.
Personnel	Intermediate	Manages employee data such as hire date, salary, manager, time off and date of next review. Integrates the information with the Expense Report template for more detailed information on every employee.

FileMaker Training Series: Basics for FileMaker 14

STARTER SOLUTION	SKILL LEVEL	FEATURES
Projects	Intermediate	Manages project descriptions, a history of active and completed tasks, and all personnel associated with an assignment.
Research Notes	Intermediate	Compiles and organizes all research notes in one location. It also helps track web search notes.
Resource Scheduling	Intermediate	Manages the scheduling and commitment of resources.
Time Billing	Intermediate	Calculates hours worked, hours billed, and the hourly rate for each employee on a weekly basis. Provides a way to track billing by customer.
Estimates	Advanced	Manages data for customer estimates, such as products, terms, discounts, tax rates, and more—and keeps track of how the information relates to both relevant customers and products. Easily prints estimates.
Event Management	Advanced	Tracks event details including tasks, agenda, invitees/guests, contributors, gifts, and thank you notes.
Invoices	Advanced	Similar to the Estimates template, but with data targeted toward invoicing needs. Manages contacts, products, and invoicing. Great for small businesses.

FileMaker Training Series: Basics for FileMaker 14

STARTER SOLUTION	SKILL LEVEL	FEATURES
Tasks	Advanced	Tracks tasks and their owners for any project, and instantly access details through each step.

LESSON 2

Section 2: Quick Mobile Development

If you want to create a FileMaker solution accessed by both FileMaker Pro and FileMaker Go users, many of the Starter Solutions provide an excellent framework for mobile use with FileMaker Go. Each has been designed to detect the device used to access it and then display an optimized interface for that device. Personnel Records, Research Notes, and Time Billing all have specific iPad layouts—and the other solutions have layouts that are designed for both iPad and iPhone. The Starter Solutions take advantage of Multi-Touch Gestures, allowing users to swipe to view more data and to navigate between records.

Complete the following activity to learn some of the features of Starter Solutions that are optimized for iOS.

Activity 2.1: Exploring the Event Management Starter Solution

1. Open FileMaker Pro 14. The **Launch Center** opens automatically—if it does not, select **Open...** in the **File** menu.
2. Choose **New...**, **New from Starter Solution...**, then choose **Event Management**.
3. Name the file "**Event Management.fmp12**" and save it to your desktop. After the file is saved, the solution opens to the **Events** layout.
4. Click on the existing event and enter some test data of your own in the record that the solution created.

FileMaker Training Series: Basics for FileMaker 14

5. Click on the **Tasks** tab, click on **Add Task**, then add a few tasks, as pictured in Figure 6.
6. Close the file.

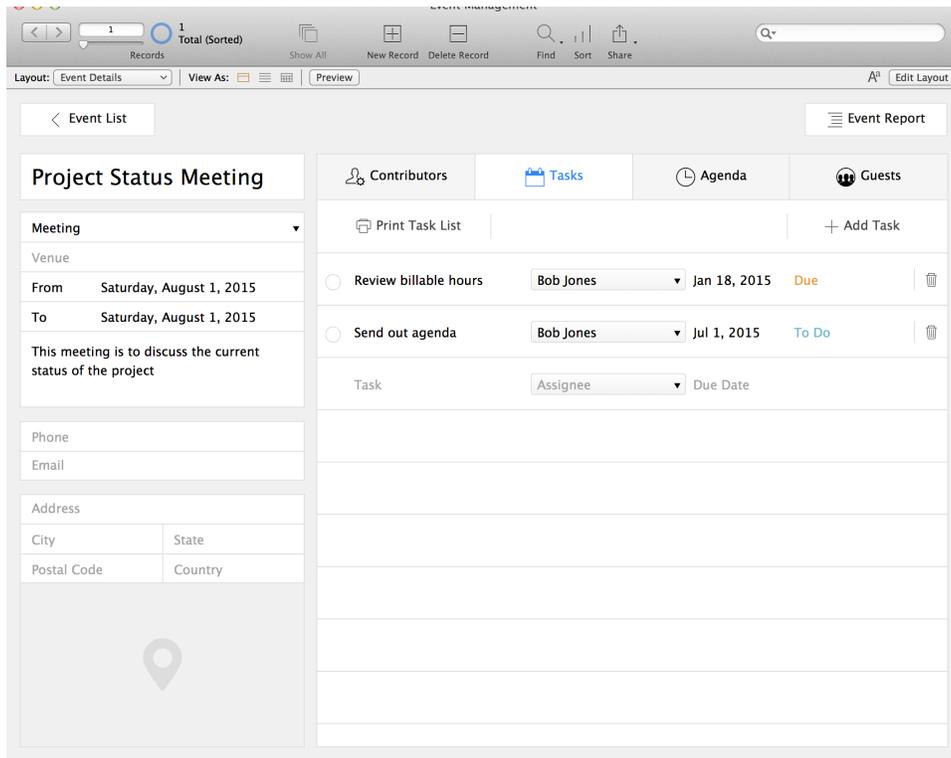


FIGURE 6

Lesson 2: Review Questions

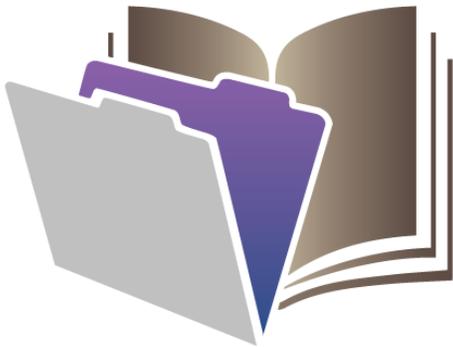
1. If you need to create a solution that keeps track of customers, products, and purchase orders, which Starter Solution should you use?
2. Which template would you use to build an iPad solution for a scientist who needs to collect lab notes?
3. What are the main differences between the Starter Solutions for Assets and Inventory?
4. Describe one possible use of the Starter Solution for Content Management.
5. What are three features that make Starter Solutions so helpful to mobile development?
6. Which Starter Solution helps track an employee's time off?

Lesson 2: Review Answers

1. The Starter Solution for Invoices works best in this situation—to keep track of customers, products, and purchase orders.
2. Research Notes is ideal for this solution.
3. The Assets solution tracks office assets and other depreciable items. Its fields include asset category, serial number, and purchase date. It calculates depreciation using the straight-line method. The Inventory solution tracks product inventory items, including category, value, and more.
4. The Content Management solution tracks different media files and relevant information such as categories and status, as well as details about their revision history. It can be used for images, documents, videos, and much more.
5. Three features that make Starter Solutions helpful to mobile development are: they automatically show a layout optimized for each device; they are built with layout features that optimize space and viewing on mobile devices; and they were designed for easy data entry and take advantage of Multi-Touch gestures.
6. Personnel Records helps track an employee's time off.

Lesson 3

Viewing and Working with Data



Lesson 3: Viewing and Working with Data

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Contacts.fmp12

Objectives

After this lesson, you will be able to:

- Describe the function of a layout, giving examples of when different layouts might be needed.
- Decide when to use the four modes available to users of a FileMaker solution.
- Compare and contrast the three layout views.
- Describe two methods used to navigate between records.
- Create a new record.

- Add, modify, save, and delete data.

Next you will use a version of the Contacts Starter Solution with data in it to help you navigate, organize, and work with data in a FileMaker solution. In this lesson, you will learn about layouts, records, different modes to work with your solution, and different ways to view and edit your data.

Here is what you learned from the **Getting Started Tour**.

Getting Started > Records & Fields

- A database file is organized into tables, tables contain records, and records contain fields, which store the actual data.
- Fields can store various types of data, including text, numbers, dates, and images.

Getting Started > Viewing Data

- FileMaker Pro displays fields on layouts.
- Databases can have many kinds of layouts, used for viewing forms or reports, printing labels, entering data on iOS devices, and more.
- **Browse**, **Layout**, **Find**, and **Preview** are four modes available to users.
- You can display layouts in **List view**, **Table** view or **Form** view. These are layout views.

LESSON 3

Section 1: Layouts

Layouts provide the user interface for a FileMaker solution and organize how you see information. Layouts do not store data. Instead, whether you are entering data or printing reports, layouts handle how that data is displayed. You can create many layouts to see the same record—or set of records—in different ways. For comprehensive instruction about layouts, refer to Lesson 9.

Switching Layouts

To move to different layouts with FileMaker Pro, use the **Layout** pop-up menu (shown in Figure 7). To change layouts in FileMaker Go, click on the folder icon in the upper left corner and choose **Layout**. The next screen, shown in Figure 8, allows you to choose the layout you wish to view.

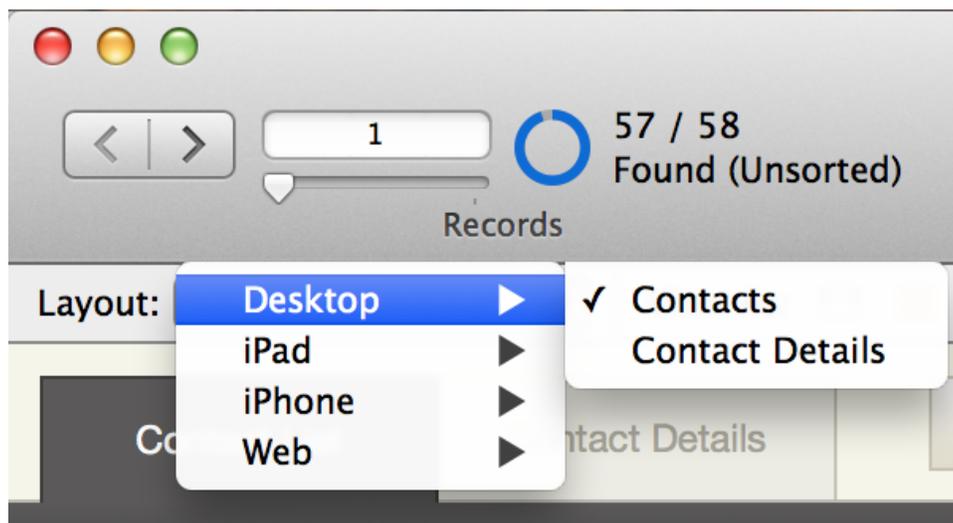


FIGURE 7

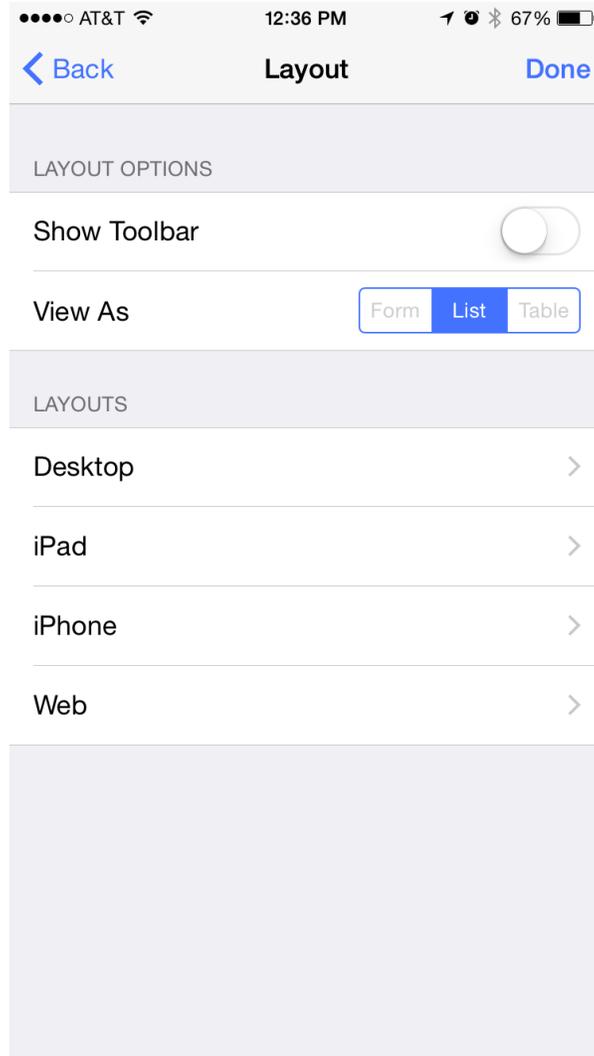


FIGURE 8

When you switch to a different layout, you might see the same records or a different set of records depending on the context of the layout. For example, you might start with a **Contact Details** layout that shows each contact as a form, then switch to a **Contacts List** layout that shows the same found set of contacts as a list. Then, you might switch to a **Company List** layout that shows a found set of company records as a list.

LESSON 3

Section 2: Modes Within Layouts

In FileMaker Pro, the modes are **Browse** mode, **Find** mode, **Layout** mode, and **Preview** mode. You can change the mode with a keyboard shortcut, through the **View** menu, or the pop-up menu at the bottom of the window as shown in Figure 9.

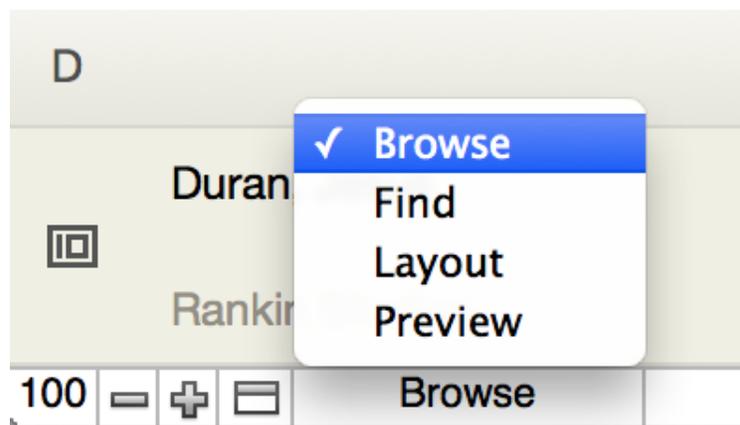


FIGURE 9

In FileMaker Go, only **Browse** mode and **Find** mode are available.

Browse mode

You will use **Browse** mode to do most of your work, including all data entry and viewing. You can add, view, edit, sort, omit (hide), and delete records.

The keyboard shortcut is **Command-B** in OS X or **Ctrl-B** in Windows.

Find mode

You can search for records that match a set of criteria in **Find** mode. First you enter your search criteria, then perform the search, and finally FileMaker Pro returns to **Browse** mode, displaying all the records that match the criteria. You can then work with this set of records, which is generally referred to as the "found set." The keyboard shortcut to enter **Find** mode is **Command-F** in OS X or **Ctrl-F** in Windows.

In FileMaker Go, to enter **Find** mode, tap the magnifying glass button, then choose **Create New Find** as shown in Figure 10.

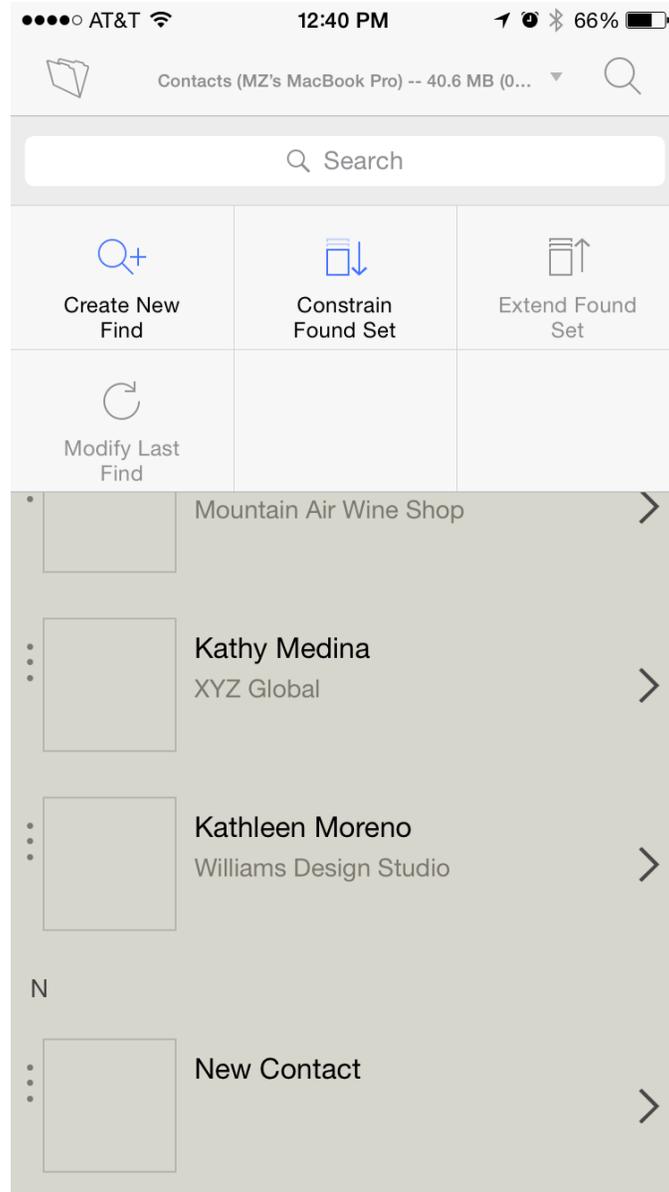


FIGURE 10

You'll learn how to use Find commands in Lesson 4.

Layout mode

To modify layouts and provide users with different interfaces to access data, you will use **Layout** mode. FileMaker Pro uses **Layout** mode to show information

both on a screen and in printed materials. This mode is not available in FileMaker Go and FileMaker WebDirect.

The keyboard shortcut is **Command-L** in OS X or **Ctrl-L** in Windows.

Preview mode

To see how data looks before you print it, use **Preview** mode. This mode is especially helpful to view layouts with multiple columns, and reports with headers and footers. This mode is not available in FileMaker Go and FileMaker WebDirect.

The keyboard shortcut is **Command-U** in OS X or **Ctrl-U** in Windows.

LESSON 3

Section 3: Views Within Layouts

You can display a layout using one of three views. In FileMaker Pro, select the view from the **View** menu or from the Status Toolbar shown in Figure 11. In FileMaker Go, you can access the **View As** options, shown in Figure 12, by tapping the folder icon in the upper left of the screen and choosing **Layout**.

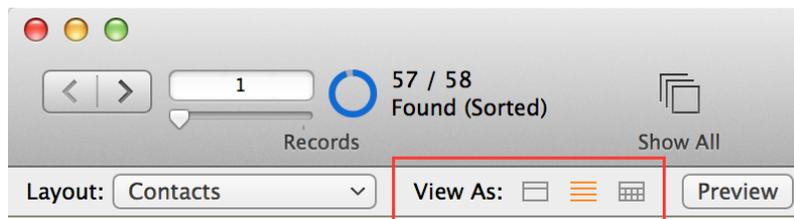


FIGURE 11

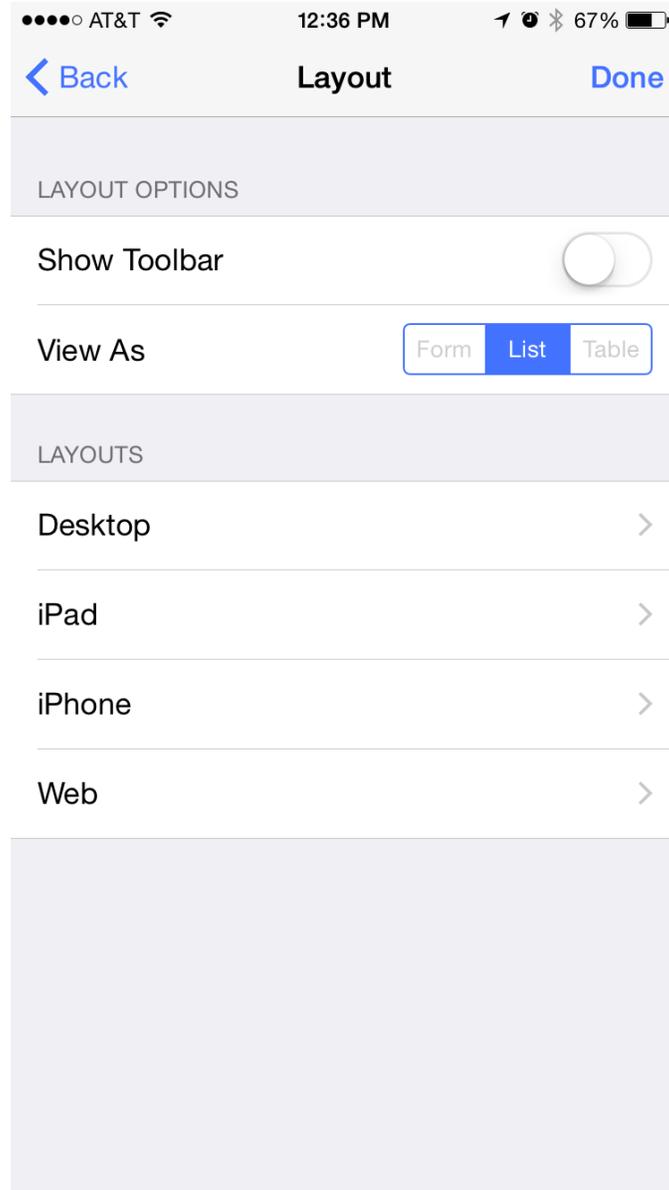


FIGURE 12

View as Form

To view and modify records individually, use **Form** view. Though you might have multiple records in the found set, you see only one record at a time in **Form** view.

View as List

You see a scrollable list of records in **List** view. Scroll up and down to browse through records. The number of records you can see at one time depends on the structure of the layout. The current record is indicated by row highlight or a thin, black bar at the left of the record and is the record that will be affected by commands such as **Delete Record** or **Duplicate Record**. When you are in **List** view, you can click or tap a record to make it the current record.

View as Table

People who use spreadsheets will discover that **Table** view looks very familiar. Data fields are represented as columns, and the records are represented as rows. **Table** view can be quite powerful because you have easy access to resize, reorder, sort, and hide columns, and to view summary data.

LESSON 3

Section 4: Records

You can navigate between records in many ways. In FileMaker Pro, the Status Toolbar includes buttons for **Next Record** and **Previous Record** and a slider shown in Figure 13. In FileMaker Go, you move between records by using the left and right arrows, or by clicking on the  icon and using the slider shown in Figure 14. While on a layout in **Form** view, you can also use a two finger swipe in FileMaker Go, touch enabled Windows tablets, and Mac OS trackpads. The Status Toolbar shows the current record number, the number of records in the set (if applicable), and the sort status.

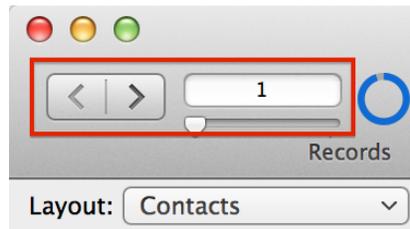


FIGURE 13

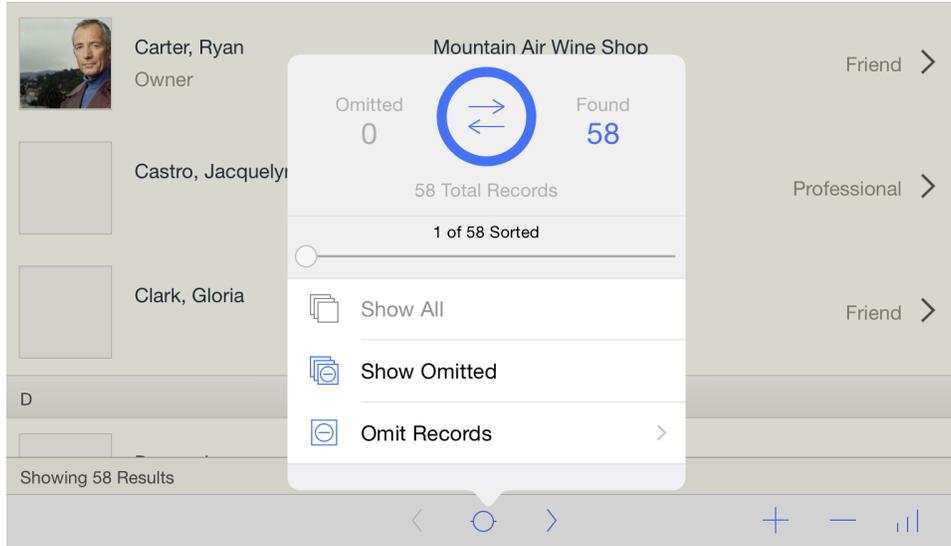


FIGURE 14

Activity 3.1 – Moving Between Layouts and Records

Practice moving between layouts and records using the methods that were described in this lesson:

1. Open the **Contacts.fmp12** file in FileMaker Pro. The file will open to the **Contact Details** layout. Which view is shown?
2. Switch to the **Desktop > Contacts** layout using the **Select Layout** pop-up menu. Which view is shown?
3. Move three records ahead by clicking the **Next** button from the Status Toolbar. The destination record is Cynthia Butler.
4. Use the slider to go to the last record. The record should be for Steve Williams.
5. Use the scroll bar on the right side of the window to scroll to the top of the window. Notice that this action does not change the current record.

LESSON 3

Section 5: Working With Data

When you use FileMaker Pro or FileMaker Go, you enter and interact with data in **Browse** mode.

Creating a New Record

When entering new data, you will first create a new record. In FileMaker Go, tap on the plus/minus button and tap **Add New Record**, as shown in Figure 15.

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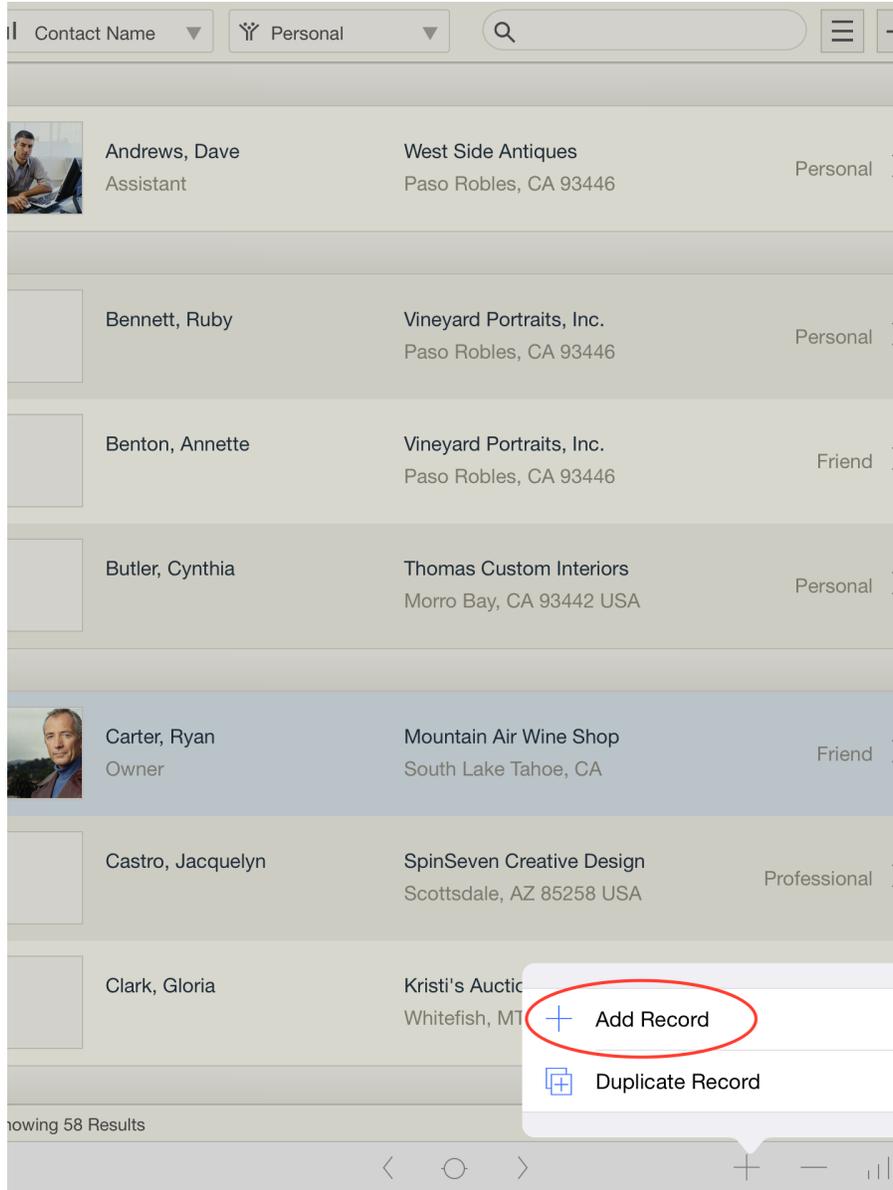


FIGURE 15

There are several ways to create a new record in FileMaker Pro. You can choose **New Record** from the **Records** menu, click the **New Record** button in the Status Toolbar as shown in Figure 16, or use the keyboard shortcut **Command-N** for OS X or **Ctrl-N** for Windows.

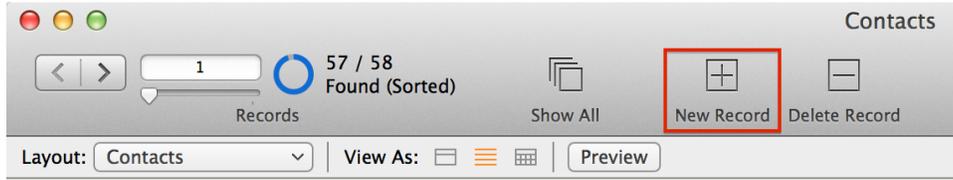


FIGURE 16

Duplicating a Record

Duplicating a record can be an efficient way to create a new record. For example, if two people live at the same address, you can duplicate one person's record and then change only the information that is different about the second person, such as their name. In an Event Management database, you can duplicate a record to create new records for events that are similar to each other, again changing only the details that differ.

To duplicate a record in FileMaker Go, tap on the plus/minus button and tap **Duplicate Record** as shown in Figure 17.

FileMaker Training Series: Basics for FileMaker 14

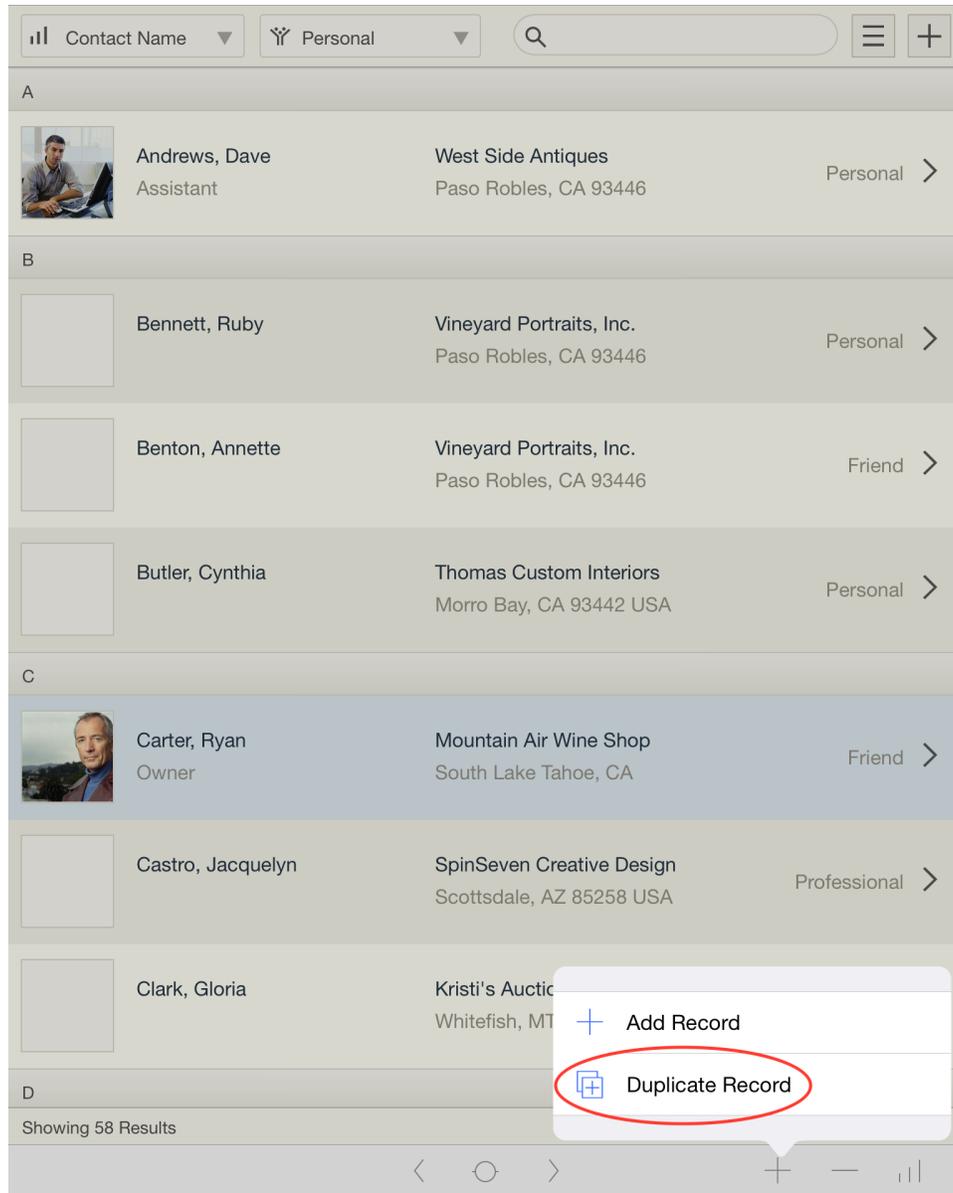


FIGURE 17

In FileMaker Pro, choose **Duplicate Record** from the **Records** menu or use the keyboard shortcut **Command-D** for OS X or **Ctrl-D** for Windows.

Modifying Data

To enter data in a field in FileMaker Go, first tap in the field to make it active. Then use the **Next** and **Previous** buttons above the keyboard to move through the fields. In FileMaker Pro, click in a field or use the **Tab** key to move from field to field. **Shift-Tab** will move you backwards through the tab order.

Some fields may require different types of data entry. Many fields are formatted as edit boxes that allow you to enter data. Other fields will have pull-down menus, radio buttons, or checkboxes to select data. If a field is set as a date, time, or timestamp, you must enter a valid value.

Saving Data

When you enter data, the record is not saved, or committed, to the file until you take one of five actions:

- Change modes
- Change to a different record
- Change to a different layout
- Click or tap outside of all fields in the record (such as the background)
- Close the window

While, by default, changes you make to the data are saved automatically as you work, you can configure any layout so that you are asked to confirm record changes first. In the **General** tab of the **File > Layout Setup** dialog shown in Figure 18, uncheck **Save record changes automatically**.

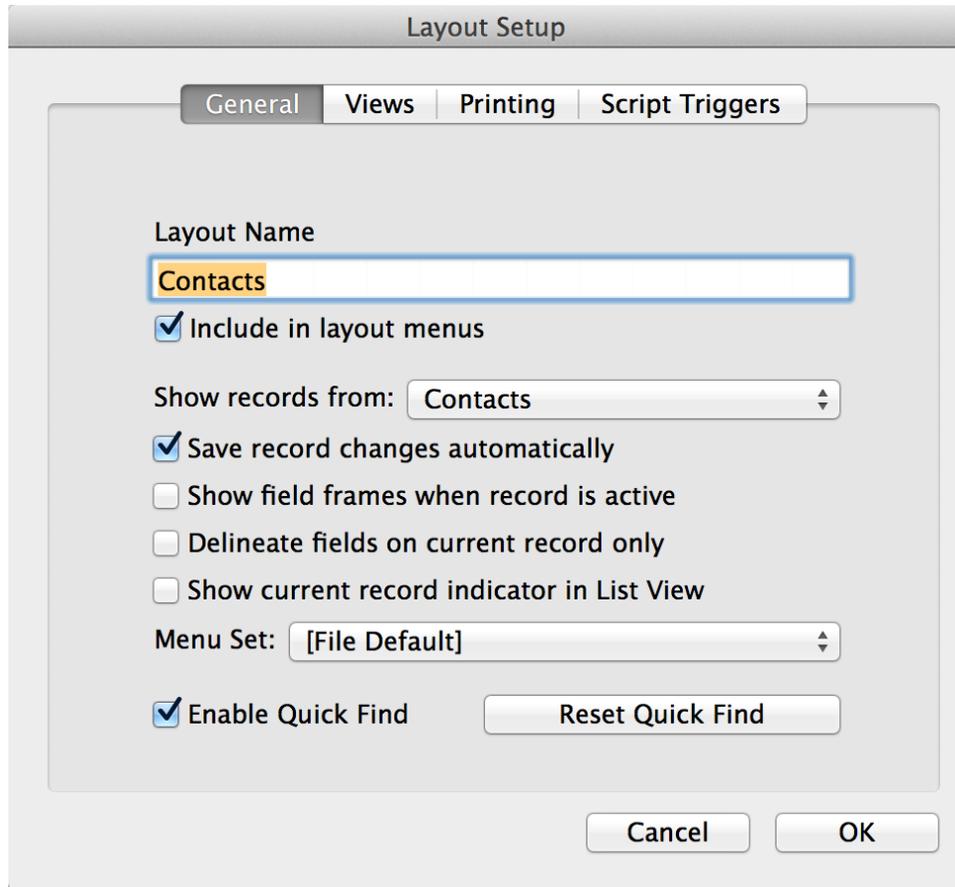


FIGURE 18

Deleting Data

Deleting a record in a FileMaker file is permanent. You cannot restore the data or undo the delete. To delete a record in FileMaker Go, tap the plus/minus button and tap **Delete Record** as shown in Figure 19.

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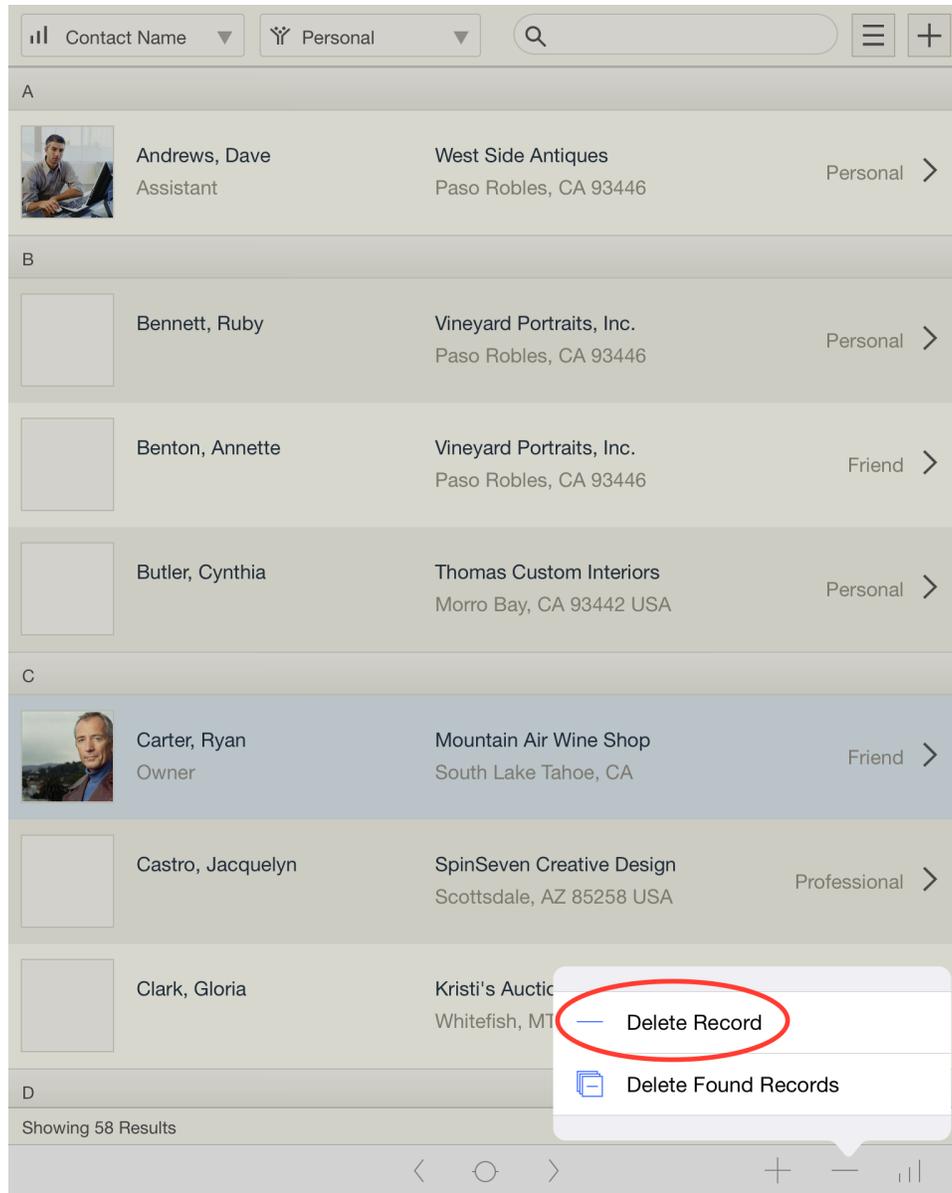


FIGURE 19

In FileMaker Pro, choose **Delete Record** from the **Records** menu, click the **Delete Record** button in the Status Toolbar, or use the keyboard shortcut **Command-E** for OS X or **Ctrl-E** for Windows.

In both FileMaker Pro and FileMaker Go, a dialog will ask you to confirm that you want to delete the record permanently.

Activity 3.2 – Creating New Records and Entering Data in FileMaker Pro

Practice creating new records and editing data in the Contacts starter solution.

1. Open **Contacts.fmp12** and navigate to the **Contact Detail** layout.
2. Click the **New Record** button in the Status Toolbar.
3. Fill out the new record with your contact information. Use the **Tab** key on the keyboard to navigate between fields.
4. When finished, click on the background of the layout where there are no objects. This will save the record.
5. Delete your record by either clicking **Delete Record** in the Status Toolbar, or going to **Records > Delete Record**.
6. When asked to **Permanently delete this ENTIRE record**, click **Delete**.

Lesson 3: Review Questions

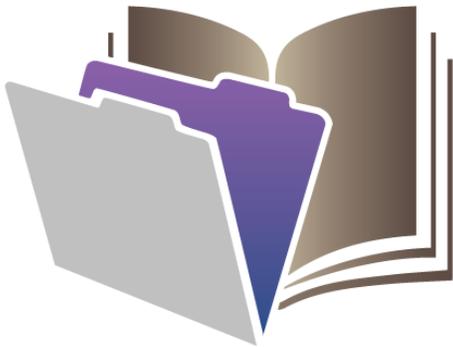
1. If you want to view a database like a spreadsheet, which view should you use?
2. When you are browsing records in FileMaker Go, how can you move to the next record?
3. Which mode would you use to create a new record?
4. What are three ways that you can save, or commit, a record?
5. How many users can modify a record at once?
6. Can deleting a record be undone?

Lesson 3: Review Answers

1. The **Table** view shows the fields in columns and records in rows.
2. You tap the **Next** and **Previous** buttons to move between records or use a two finger swipe motion in FileMaker Go 14.
3. Use **Browse** mode to create a new record.
4. You can commit a record by changing layout, changing mode, changing record, or clicking or tapping outside all the fields of the current record.
5. Only one user can modify a record at a time. Another user cannot modify the record until it has been committed.
6. No, deleting a record cannot be undone. The only way to recover the data would be to import the record from a backup of the database.

Lesson 4

Finding and Sorting Records



Lesson 4: Finding and Sorting Records

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Contacts.fmp12

Objectives

After this lesson, you will be able to:

- Perform complex finds.
- Extend and constrain found sets.
- Make use of operators in your search requests.
- Sort records.

In the **Getting Started Tour** in FileMaker Pro, you learned how to perform basic searches using **Find** mode and how to perform quick searches using **Quick Find**.

In this lesson, you will learn how to do more complex searches.

Here is what you learned from the **Getting Started Tour**.

Getting Started > Finding Data

- Use Find mode to search for records containing data stored in specific fields.
- Use Quick Find to search across all fields on the current layout.

Getting Started > Sorting Records

- Sorting changes the order in which data is displayed.
- You can sort data by multiple fields to group records.

LESSON 4

Section 1: Specifying Search Criteria

When performing a simple search, FileMaker by default performs a "words begin with" search. This means that the field you are searching can contain:

- Longer words that begin with the values you specify
- Other words in addition to the ones you specify
- Values in any order

For example, if you were to enter "mary" as the search criteria in a First Name field, your found set will include records for Mary, Mary Beth, Maryann, and Rose Mary. But it will not find Rosemary or Jomary. Note that searches are not case sensitive (unless the indexing of the field is set to Unicode).

The quickest way to search is to use the contextual shortcut menu to find matching data in a particular field. Right-click (or Control-click) a field that has the criteria you want. Choose **Find Matching Records** from the shortcut menu and FileMaker Pro finds records that have the same value in that given field.

Activity 4.1: Contextual shortcut for Finds

Find records matching the **Company** field for West Side Antiques.

1. In the **Contacts** file, go to the **Contact Details** layout.
2. Click **Show All** in the Status Toolbar, if necessary, and navigate back to the first record.

3. Right-click or Control-click in the **Company** field containing “**West Side Antiques**” and a pop-up menu appears.
4. Choose **Find Matching Records**. Your new found set includes 6 contacts that work for “**West Side Antiques**”.

Performing AND or OR Searches

Sometimes it is helpful to find data based on multiple criteria—for example, all contacts that are Artists at Rankin Studios. This can be done in **Find** mode by entering criteria into each relevant field, in this case **Job Title** and **Company**. The search results will be comprised of records that match all the criteria you entered. This is known as an AND search.

On the other hand, what if you want to search for people who work at either of two different companies? Rather than using multiple fields in a single search request, as you do when you perform an AND search, you use multiple requests to perform an OR search. This allows you to submit different values into the same field, in this case the **Company** field.

Activity 4.2: Performing AND and OR searches

Perform an AND find for Contacts who are Artists at Rankin Studios. Then perform an OR find for Contacts who work at Kristi's Auctions or Williams Design Studio.

1. On the **Contact Details** layout, enter **Find** mode by choosing **Find** mode from the **View** menu.

2. Enter "**Rankin Studios**" into the **Company** field and "**Artist**" into the **Job Title** field. Entering search terms into two or more fields within the same find request creates an AND find.
3. Click **Perform Find** in the toolbar. All artists at Rankin Studios are returned.
4. Enter **Find** mode again. This time you will create an OR find by using multiple find requests.
5. Enter "**Kristi's Auctions**" into the **Company** field.
6. Click **New Request** in the **Status Toolbar**, and enter "**Williams Design Studio**" into the **Company** field.
7. Click **Perform Find** in the toolbar.
8. Switch to the **Contacts** layout in the upper left. Notice 8 contacts work for Kristi's Auctions or Williams Design Studio.

LESSON 4

Section 2: Extending and Constraining a Found Set

When performing a new search, FileMaker Pro searches all records and replaces your previous found set with a new found set. This works well for most searches, but occasionally it is necessary to search within a found set or to add records to your current found set. FileMaker allows users to either extend or constrain the existing found set with the following menu options:

- **Extend Found Set:** When you extend your found set, the omitted records are searched. Any omitted records that match the search criteria are added to the current found set.
- **Constrain Found Set:** When you constrain your found set, the search is performed only on the records in the current found set, rather than all the records in the table. Any records in the current found set that match the search criteria are returned.

Both the **Extend Found Set** and the **Constrain Found Set** options are in the contextual shortcut menu and the **Requests** menu.

Activity 4.3: Extending a Found Set

Perform a find for Contacts in the Friend group, then extend your found set to include Contacts in the Personal group.

1. On the **Contact Details** layout, enter **Find** mode.

2. Enter "**Friend**" in the **Group** field and perform the find. Notice the found set is 13 records.
3. Go back into **Find** mode and enter "**Personal**" in the **Group** field.
4. Choose **Requests > Extend Found Set**. Your results include 26 contacts in either the Personal and Friend groups.

Note: Using **Extend Found Set** is the equivalent of performing an OR search.

Activity 4.4: Constraining a Found Set

Perform a find for Contacts that work at West Side Antiques, then constrain your found set to only Assistants.

1. On the **Contact Details** layout, enter **Find** mode.
2. Enter "**West Side Antiques**" in the **Company** field and perform the find. Your results should include 6 records.
3. Go back into **Find** mode and enter "**Assistant**" in the **Job Title** field.
4. Choose **Requests > Constrain Found Set**. You will see 3 contacts who are Assistants at West Side Antiques.

Note: Using **Constrain Found Set** is the equivalent of performing an AND search.

LESSON 4

Section 3: Using Operators in Search Criteria

An operator is a symbol or instruction that gives you more flexibility with your search criteria. For example, you can search a date range by entering two dates separated by the range operator (...).

When you enter **Find** mode, you will see that the Status Toolbar contains a drop-down menu labeled "Insert: Operators" (Figure 20). You can either choose an operator from the drop-down menu or you can enter it with the keyboard.

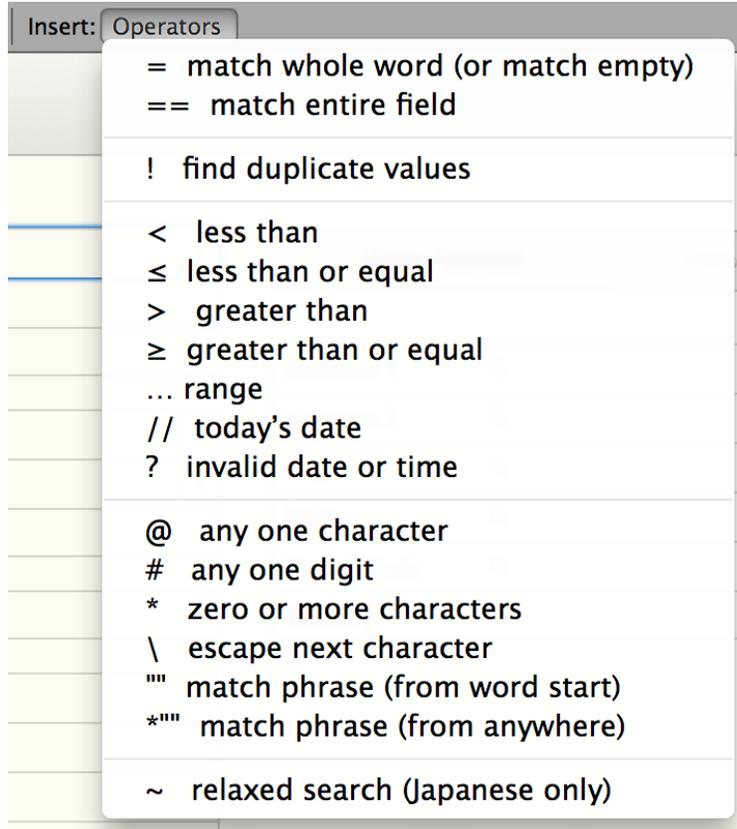


FIGURE 20

Operators are helpful for finding ranges of dates, times, and numbers, using “wildcards” to find partial matches in text searches, or changing FileMaker’s default “words begin with” behavior. They are also used to search for records where a given field is either empty or has data.

Activity 4.5: Finding Empty Fields

Perform a search to find Contacts without a mobile phone number.

1. On the **Contact Details**, enter **Find** mode.
2. Enter "=" in the **Mobile** field.

3. Click **Perform Find** in the toolbar, or press the **Enter** key. The found set should contain 35 contacts without a mobile phone number.

Activity 4.6: Finding Non-Empty Fields

Perform a search to find Contacts with a personal phone number.

1. On the **Contact Details**, enter **Find** mode.
2. Enter "*" in the **Personal** phone field. This tells the database to find records where the field content is not empty.
3. Click **Perform Find** in the toolbar, or press the **Enter** key. The found set should contain 37 contacts with a personal phone number.

Finding Strings of Characters in a Field

Another way of using the asterisk (*) operator is to modify the "word begins with" behavior of **Find** mode. For example, you can find all values in a First Name field that end with "eth" by using *eth as your search criteria. This search would find people such as Beth and Elizabeth, but it would not find Bethany.

If you want to find values in a **First Name** field that include "eth" anywhere in the value, your search criteria should be *eth*. This will find any values that start with, include, or end with "eth," so it would also find people such as Beth, Elizabeth, and also Bethany.

Finding a Range of Data

When you work with numbers, dates, and times, you may want to search for data in ranges. For example, suppose you want to find all orders shipped from the start of January to the end of March in 2015, or all items over \$500. To perform such searches, use operators like greater than (>), less than (<), or an ellipsis (...).

Find mode has four operators to help find data before or after a specific value: greater than (>), greater than or equal to (\geq), less than (<), and less than or equal to (\leq). In **Find** mode, place any of these operators before the value. For example, to find all assets over \$500, place “>500” in the cost field.

The ellipsis (...) allows users to find data between two values. For example, in order to find dates between the beginning of January and the end of March, enter 1/1/2015...3/31/2015 in the Ship Date field. You can select the ellipsis from the operators pop-up menu (Figure 20), type three periods, or type **Option–;** (Option–semicolon) on OS X.

Finding Exact Data

While the default "word begins with" logic is usually helpful in finding data quickly, it can return more records than you might want. For example, searching for "North" in a Region field results in values like "North," "Northwest," and "Northeast."

- **Exact field match:** To be more specific in a search, use two equal signs (==) to obtain an exact field match. Entering "==North" in the Region field shows only those records that have the exact value "North".

- **Exact word match:** One equal sign (=) performs an exact word match. For example, "=North" results in records containing "North" and "North Pole," but not "Northeast."

LESSON 4

Section 4: Sorting Records

Whether you are looking at all records or a found set, it is often helpful to sort your data. For example, you could sort contacts alphabetically by Last Name, or sort invoices in ascending date order by their Ship Date. By default, records display in the order in which they were created in the table.

To open the **Sort Records** dialog (Figure 21), click **Sort** in the Status Toolbar, or use the keyboard shortcut **Command-S** (OS-X) or **Ctrl-S** (Windows).

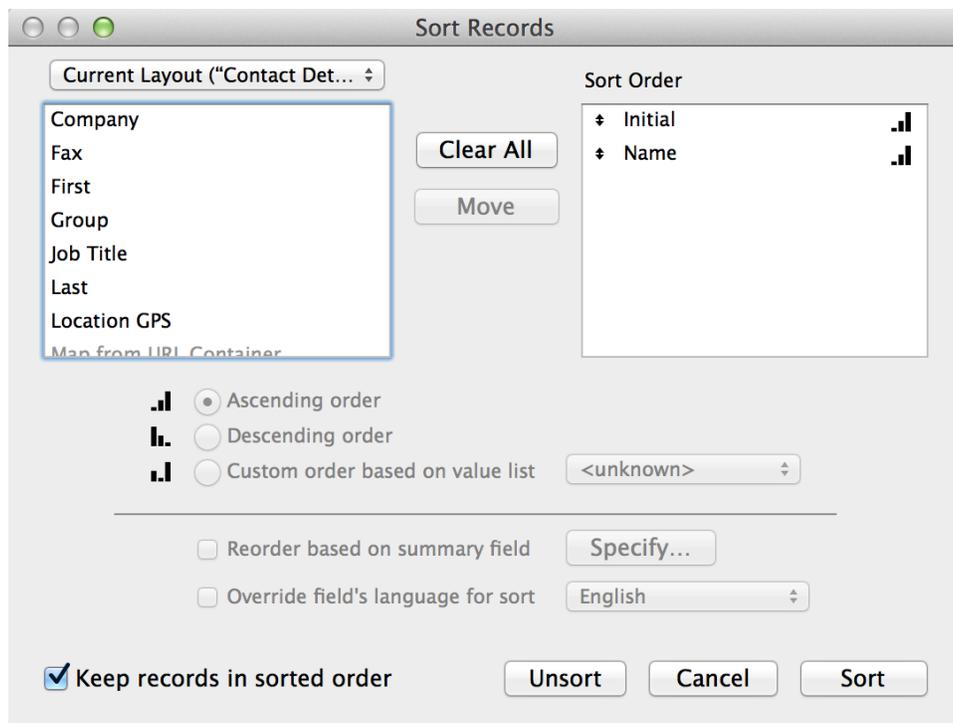


FIGURE 21

Choosing Sort Fields

In the **Sort Records** dialog box, the left side contains a list of all the fields on the current layout. By clicking **Current Layout (...)**, you can choose to sort on other fields in the solution.

To add a field to the sort order, **double-click** the field name in the list, or select the field and click **Move**. You can sort by one field or multiple fields. In Figure 22, the data sorts by **Last** ascending, then **First** ascending.

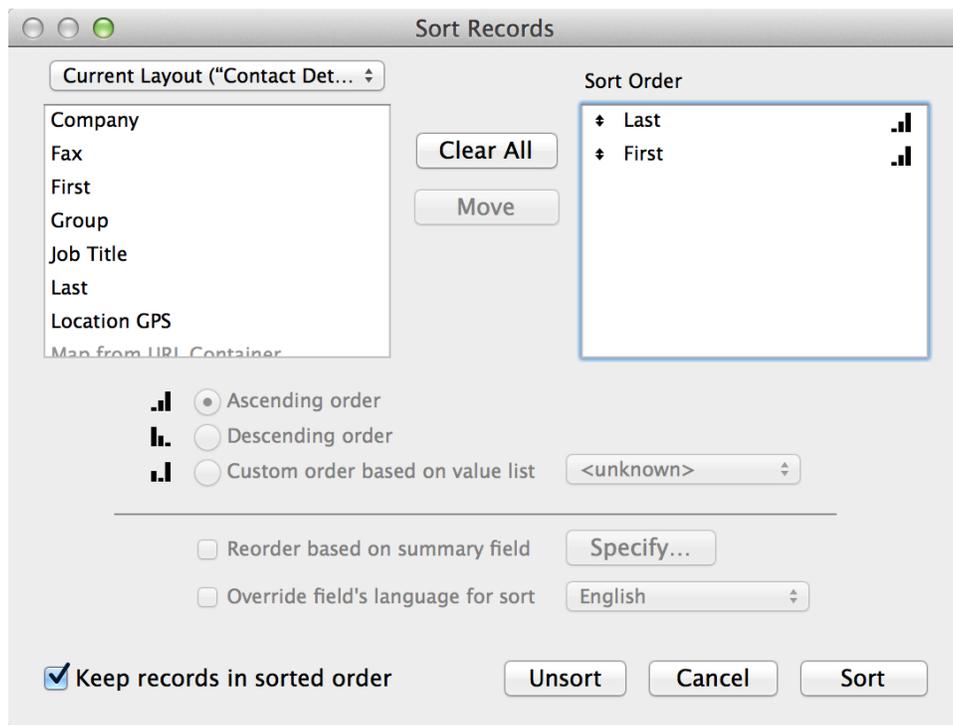


FIGURE 22

Setting Sort Order

The icon to the right of the field in the **Sort Order** box indicates how the data will sort. To specify ascending or descending sort order for a field, select the field in the **Sort Order** pane and choose **Ascending order** or **Descending order** using the radio buttons in the middle of the dialog. You can also click the **Unsort** button at the bottom of the dialog, which returns the records to creation order.

Lesson 4: Review Questions

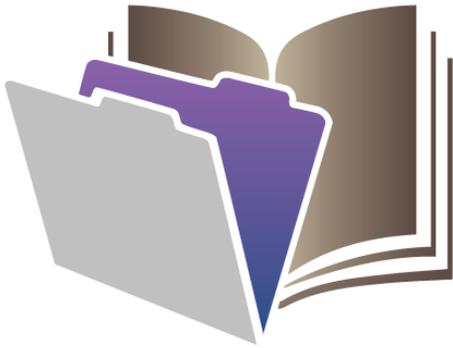
1. Describe two ways that you can perform AND searches.
2. How can you find all records with an empty field?
3. What operators allow finding of ranges of dates, times, and numbers?
4. In what order do records show if they are not sorted?

Lesson 4: Review Answers

1. Two ways to perform AND searches:
 - Type criteria into multiple fields in one single search request.
 - Perform a simple search, and then narrow the found set by using **Constrain Found Set** through the application menu or the contextual shortcut menu.
2. To find all records with an empty field, use the = sign in **Find** mode in the field.
3. The operators for finding ranges of dates, times, and numbers are: Greater than (>), Greater than or equal to (≥), Less than (<), Less than or equal to (≤), and Ellipsis (...).
4. Records will show in the order they were created when they are not sorted.

Lesson 5

User-Centered Design



Lesson 5: User-Centered Design

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Contacts.fmp12

Objectives

After this lesson, you will be able to:

- Identify the steps of the design process.
- Describe your user's goal as a one-sentence problem statement.
- Understand the needs of the fictitious company "Equipment Providers, Inc." used in the rest of the lessons of this training program.

User-centered design is an established methodology for designing software interfaces that involves the eventual users of the software in each stage of the design process. It forces developers to focus on the user—and to step away from the computer.

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Here, the aim of user-centered design is to build FileMaker solutions that focus on users' goals, not features. By focusing on goals, you will ensure that your solution is solving the right problems, therefore making your users more confident and successful.

LESSON 5

Section 1: What is User-Centered Design?

The developers that are making a difference in the world are taking great technologies and shaping them with user-centered design.

Three Basic Principles

The basic principles of user-centered design are:

1. Observe users' goals, behaviors, mental models.
2. Make technology serve users, not the other way around.
3. Test with users by giving them a natural goal and observing what they do.

If you are doing user-centered design correctly, you will be repeating this process over and over again until you identify what really meets the users' expectations.

Think Goals Not Features

Start by understanding what the user wants to achieve, not the features you *think* the user needs.

Why? Because goals are much more descriptive than features. For example, consider a Porsche and a riding lawnmower. They have many of the same features, including an internal combustion engine, four wheels and rubber tires, a transmission, and a steering wheel. But when described in terms of goals, the lawnmower cuts grass evenly while the driver is seated comfortably. That's not typically what people want to do with a Porsche.

Think Differently

Building a solution begins with the user-centered design process, not with development in FileMaker Pro. By stepping away from the computer, you free yourself to think and act differently during the design process.

Find ways to free up your imagination: do some "whiteboarding" with users, and find inspiring design patterns from other places, like the Starter Solutions or your favorite apps.

Build up your knowledge: a solid understanding of what is possible with the FileMaker Platform will help you come up with better ideas.

Don't be intimidated by user-centered design. Adopt one, two, or a few of these practices and grow from there.

LESSON 5

Section 2: Basic Principles

Observe users — their goals, behaviors, and mental models

Taking the time up front to understand your audience and their needs is the first step in designing a truly useful and usable solution that your users will love. Put yourself in their shoes and get to know their job roles from the inside out.

Describe your user's goal as a one-sentence problem statement:

Design a [form of solution]
For [user type]
To [human activity]
With [level of support]

For example, for a hospital, the statement might be:

Design a [kiosk application]
For [urgent care patients]
To [sign in]
With [speed]

Your users will likely have more than one goal. Write down all your users' goals and their problem statements. You may have users with different goals and you will need to prioritize which problems are the most important. However, don't try to solve every problem at once. Solve a simple problem first, then, gradually add complexity.

Sketches, whiteboards, wireframes, and flowcharts can be helpful in communicating what you have learned. Allow yourself to be creative and observe your users.

Make technology serve users — not the other way around

The FileMaker Platform gives you many tools to simplify the user experience. But like any tool, it can be used in many different ways. Your design choices will determine how users react to your solution.

Test with users — give them a natural goal, then sit back and watch

Prototypes may start as flowcharts and whiteboards, but they will evolve into something your users can actually use. During this phase, be flexible and allow your ideas and solutions to change. Ask for feedback from users and have a discussion on what the solution lacks and offers for the users. During this whole process, revisit previous steps. The design process involves multiple iterations in order to create a successful solution.

LESSON 5

Section 3: Equipment Providers, Inc.

Throughout the rest of the *FileMaker Training Series: Basics*, you will be learning FileMaker by building a solution for a fictitious company, Equipment Providers, Inc. The company rents office equipment to a number of customers. you will start by going through the steps of the user-centered design process.

Observe users — their goals, behaviors, mental models

The Equipment Providers, Inc. management team has noticed that many assets are not being tracked properly. While employees try to track data in an Excel spreadsheet, they are not consistent about it. Occasionally, employees will write asset details on a sticky note and ask the company's administrative assistant to type the data into the spreadsheets, but the notes get lost among other paper or accidentally thrown away.

A review of the data reveals that it's often misspelled or entered inconsistently. For example, the Asset category column shows mismatched terms like "Office Furniture" and "Furn.: Office", making it difficult to group and sort the data properly.

When it comes to the Customer information, most of the existing information is out of date. Employees depend on their own address books instead of the spreadsheet, which limits shared access by other employees. Additionally, Customers are required to sign a paper copy of the Asset information to confirm that they received the asset. These paper copies are rarely placed in the filing

system in a timely manner—usually 3 to 4 weeks after being signed. In other words, the current spreadsheets in place are either missing data or outdated.

This fictitious example has the following primary one-sentence problem statement:

Design a [customer asset tracking solution]
For [the operations team]
To [know which customers have which assets]
With [speed and accuracy]

In addition, the following elements are relevant:

- Currently the customer and asset data is stored in Excel spreadsheets.
- It will be important to know when an asset was purchased, when it was given to the customer, and how much the asset cost.
- When the customer receives the asset, a signature is required. Currently, a form is printed out with asset details and the customer signs the form. However, all employees carry iOS devices provided by the company, so the best plan would be to leverage those devices for signing out assets.
- Users want the ability to add notes to a given asset. Notes can be anything from details about the asset (color, size, etc.) to damage information recorded when the asset is returned by the customer. It would be best if the user could type information into a notes field.
- It is imperative to know how long a customer has leased each asset.
- It will be important to know the total cost of a customer's assets.
- Users, except for the Admin account, should not be able to modify customer information. All users can edit asset data.

- Users cannot delete any customers or asset records.
- Pushing the data to the web would be useful so that customers can see a list of the assets they have.
- It would be helpful to have a report that provides all assets by customer and the total cost per customer.

Based on the relevant points observed about the Equipment Providers, Inc. scenario, there may be additional one-sentence problem statements. Here are a few others to consider:

Design an [iPad workflow]
For [a delivery worker]
To [get a customer's signature]
With [security and reliability]

Design a [method of inputting data]
For [an operations team member]
To [take notes about an asset]
With [speed and portability]

Design a [report]
For [an administrative assistant]
To [view assets for customers and their total cost]
With [up to date information]

Make technology serve users — not the other way around

Employees deliver and install equipment onsite. Most of the sites are office buildings. A signature is collected from the customer to verify that the equipment was properly delivered and installed. For these reasons, it would be easier for

these employees to access the solution from iPhone or iPad rather than from a computer.

The employees have a lot of deliveries and installations during the day so they need a solution that requires very little time to view and record information.

As you continue through the training, you will build a solution for Equipment Providers, Inc. while learning about data, user interface, solution logic, reporting, integration, security, and deployment.

Lesson 5: Review Questions

1. What are the three basic principles of user-centered design?
2. What is the template for a one-sentence problem statement?
3. What is the primary one-sentence problem statement for the employees of the fictitious company, Equipment Providers, Inc.?

Lesson 5: Review Answers

1. First, observe users taking note of their goals, behaviors, and mental modes. Next, make the technology serve users, not the other way around. Lastly, test with users by giving the natural goals, and watch their behaviors.
2. Design a [form of solution]
For [user type]
To [human activity]
With [level of support]
3. Design a customer asset tracking solution
For Operations
To know which customers have which assets
With speed and accuracy

Lesson 6

Importing Data



Lesson 6: Importing Data

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson Files

Customers.xlsx, Assets.xlsx

Objectives

After this lesson, you will be able to:

- Identify common file formats that can be converted by FileMaker Pro.
- Convert a supported file format into a FileMaker solution.
- Convert an Excel workbook with multiple worksheets into a single FileMaker solution.

There are three primary methods for creating a solution: beginning with a Starter Solution and modifying it to meet your needs, importing data from another source, and creating a solution from scratch.

In this lesson, you will begin to build the solution for Equipment Providers, Inc. by importing data from two spreadsheets.

In the **Getting Started Tour** you learned:

Getting Started > Importing Records

- You can import data from another FileMaker Pro file or from another application, such as Microsoft Excel.
- When you import, you can add new records to your database or update data in existing fields.

LESSON 6

Section 1: Converting an Existing File

FileMaker Pro can import many different file formats. This is useful because the conversion process automatically creates tables, fields, and records, reducing the number of steps required to get started using FileMaker Pro. It also removes the need to manually input information that you already have. File formats that will convert directly into FileMaker files include:

- Microsoft Excel files (.xls or .xlsx)
- Tab-separated text files (.tab or .txt)
- Comma-separated text files (.csv or .txt)
- Merge files (.mer)
- dBASE files (.dbf)

Other file types will need to be converted to one of the supported file formats before they can be converted to **.fmp12**. For example, the records from a Microsoft Access database (.mdb) can be exported as Microsoft Excel files.

You may need to clean up your spreadsheets to make the transition to FileMaker Pro easier. For example, include a header row (which FileMaker Pro will interpret as field names), remove any blank rows, and remove any subtotal or total rows (since FileMaker Pro allows you to create necessary fields to show summarized data).

LESSON 6

Section 2: Converting Excel Files

An Excel spreadsheet is one of the most frequently imported file types.

FileMaker retains Excel data types such as text, numbers, dates, etc. when data is imported. If a column of data in the original spreadsheet is a mix of data types, FileMaker Pro will import that column as text.

In the case of Equipment Providers, Inc., you will import two sets of data: Customers and Assets.

Activity 6.1: Importing a spreadsheet to create a new FileMaker file

You will create a FileMaker file called **Equipment Rentals.fmp12** using the spreadsheet data included with *FileMaker Training Series: Basics*. When you bring data into FileMaker Pro, tables are automatically created and the data is populated into fields.

1. Click and drag the **Customers.xlsx** file over the FileMaker Pro application icon in your computer's toolbar.
2. In the **First Row Option** dialog, select **Field Names** and click **OK**. This tells FileMaker Pro that the first row contains column headers that should be used as field names in the new database.
3. Name the file "**Equipment Rentals.fmp12**" and save the file on your desktop.

4. Go to **File > Manage > Database...** and go to the **Tables** tab. The import process named the first table the same name as the file. Since the data in this table is customer data, select the Equipment Rentals table, type "**Customers**" in the **Table Name** area, and click **Change**.
5. Click **OK** to exit the **Manage Database** dialog.
6. Your file has been created and FileMaker Pro will show you the data on a Layout named **Layout #2**, shown in **Table** view.

Note: You can also import data files from the **Launch Center** by choosing **New... > New from Existing**.

Activity 6.2: Importing a spreadsheet into an existing FileMaker file

Your users will also want to view Asset data in this solution. Import the **Assets.xlsx** spreadsheet into the Equipment Rentals file.

1. Choose **File > Import Records > File...** Navigate to the **Assets.xlsx** file and click **Open**. The second set of data must be imported into a new table.
2. Click on the drop-down labeled **Target** on the upper right of the **Import Field Mapping** dialog and choose **New Table ("Assets")**.
3. Check the box for **Don't import first record (contains field names)**. Your screen should look like Figure 23.

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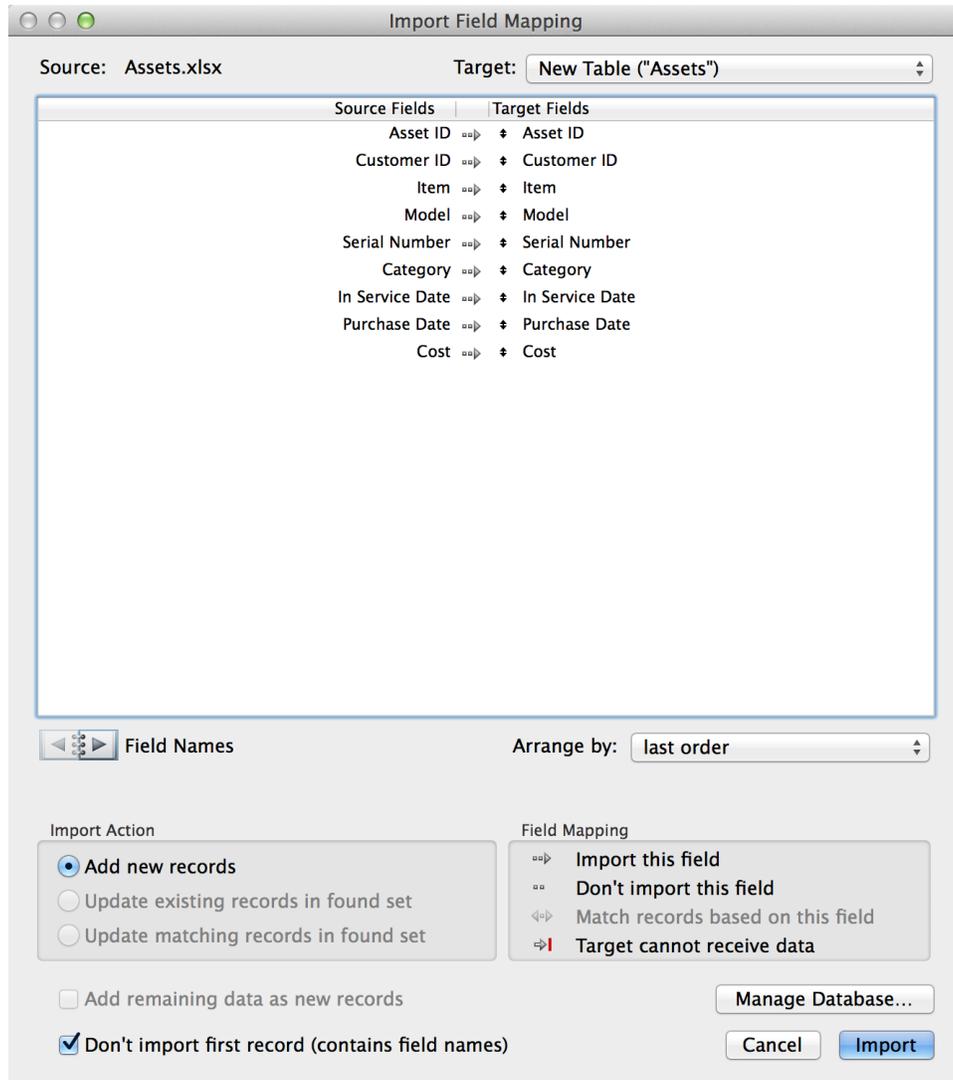


FIGURE 23

4. Click **Import**. After the import, the **Import Summary** window will show that 29 records have been imported. Click **OK**.

At this point, two tables of data exist in the Equipment Rentals file. Both the tables and the data were created during the import process.

Lesson 6: Review Questions

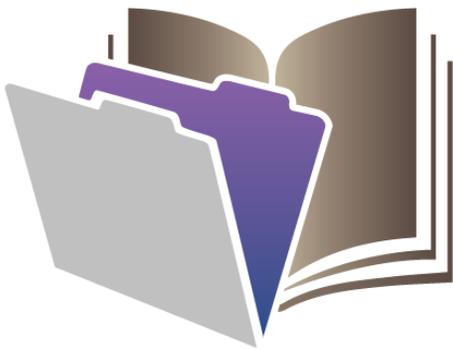
1. What are the three primary methods of creating a new solution?
2. List three common file formats that can be converted directly into a FileMaker Pro file.
3. If a file format cannot be converted directly into a FileMaker Pro file, what must you do to get the data into a FileMaker Pro file?

Lesson 6: Review Answers

1. Solutions are created by beginning with a Starter Solution, importing data from another source, or creating a solution from scratch.
2. Three of the most common file formats converted into FileMaker files are Excel, comma-separated values, and tab-separated values.
3. File formats not directly supported by FileMaker Pro must first be converted into a supported format. It may be necessary to request that the data be supplied in a supported format.

Lesson 7

Creating Fields and Tables



Lesson 7: Creating Fields and Tables

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Create tables from the **Manage Database** dialog.
- Create fields from the **Field Picker** in **Layout** mode.
- Create fields from the **Manage Database** dialog.

In this lesson, you will learn how to create fields from the **Field Picker**. You will also learn how to create tables and fields from the **Manage Database** dialog. FileMaker Pro gives you these different options to make it quick and easy to add fields while you develop your solution.

In the **Getting Started Tour** in FileMaker Pro, you learned how to add existing fields to your layout from the Field Picker.

Creating Solutions > Tables

- Databases contain tables that represent categories of data, such as Assets or Customers.
- Tables are made up of fields that store data in these categories.

LESSON 7

Section 1: Create New Tables

As you expand your solution, you may discover new kinds of data that you want to include. This will involve adding more tables and fields. Fortunately, that's not difficult to do.

To review and define tables, fields, and relationships in your solution, you can use the **Manage Database** dialog, shown in Figure 24. You can access it by choosing **File > Manage > Database...** You can also use the keyboard shortcut **Command-Shift-D** (OS X) or **Ctrl-Shift-D** (Windows).

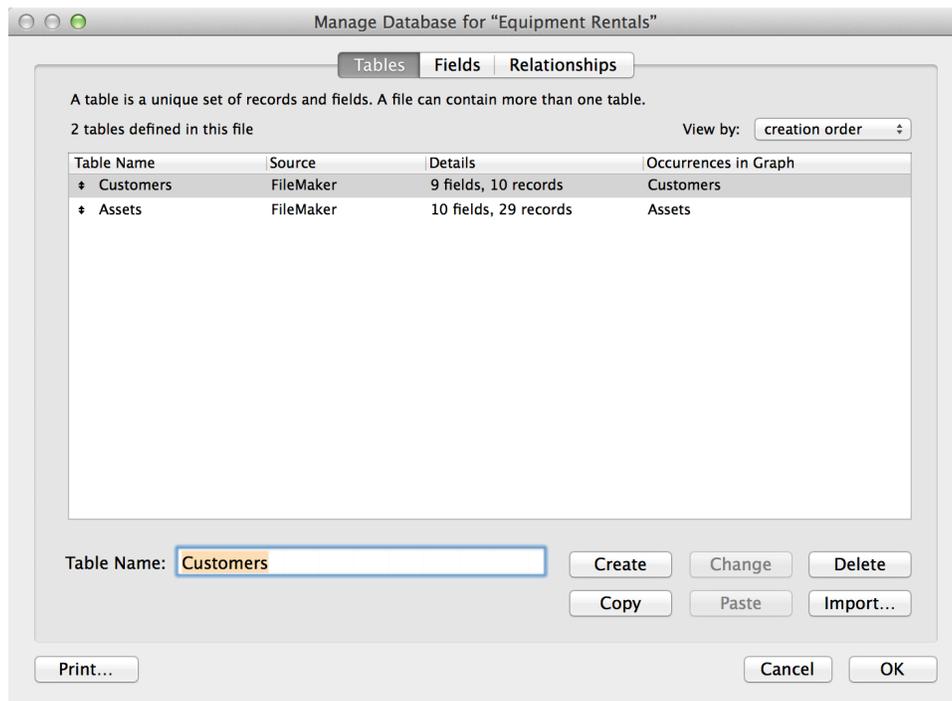


FIGURE 24

As you can see in Figure 24, the two sets of data that you imported into FileMaker Pro from spreadsheets are represented by tables.

You can create new tables for additional data on the **Tables** tab simply by typing the name of the new table in the **Table Name** area and clicking on the **Create** button. Once the table is created, you can begin to add fields.

When naming tables or fields, it is advised that you use only alphanumeric characters (or underscores). If you try to use other characters, you may see the dialog shown in Figure 25.

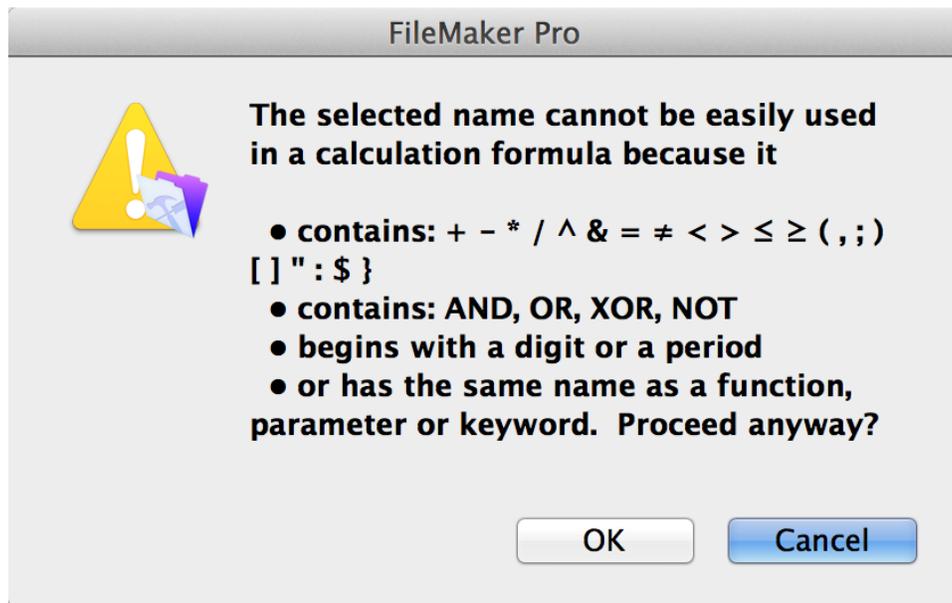


FIGURE 25

LESSON 7

Section 2: Field Types

When you define a field, you select a field type based on the kind of information the field will contain. The field type determines what kind of data can be entered and what kinds of operations FileMaker Pro can perform with the data. FileMaker Pro also uses the field type to interpret the data for tasks like sorting records and performing calculations.

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FIELD TYPE	DATA TYPE	NOTES
Text	<p>Any data that can be stored as text and does not need more specific handling. Numbers or dates can be stored, but in a Text field, they are addressed as plain text, for example in a text field numbers sort as 1, 10, 2, instead of in numerical order as 1, 2, 10).</p>	Can store approximately 2 GB of Unicode values
Number	<p>Any data that need to be treated as a number, such as data that must be sorted in numerical order or used in a mathematical calculation.</p> <p>Text strings are displayed but ignored in most database operations; if you need to enter mixed data, use a text field instead.</p>	Can store 400 digits to either side of the decimal point
Date	<p>Any date between 1/1/0001 and 12/31/4000 (assuming m/d/y date formatting).</p> <p>If you enter a date in an unacceptable format, an error dialog results.</p>	Dates are stored internally as the number of days elapsed from 1/1/0001
Time	<p>Either a duration or a specific time of day (in a 24-hour period).</p> <p>If you enter non-numeric data into a time field, an error dialog results.</p>	Times are stored internally as the number of seconds from midnight
Timestamp	<p>A combination of date and time, separated by a space.</p> <p>Timestamp fields have the same date-range restrictions as date fields.</p>	Timestamps are stored internally as the number of seconds since midnight on 1/1/0001

FIELD TYPE	DATA TYPE	NOTES
Container	Any type of binary data (data that cannot be meaningfully represented as text). Can include images, signatures, PDFs, video or audio files, or binary files of any type.	Can store approximately 4 GB of binary data

Fields Used to Automate and Aggregate Data

There are two field types that derive their value by referencing data in other fields:

FIELD TYPE	DATA TYPE
Calculation	Stores or continuously reevaluates any data based on a formula. For example, if a record has a Quantity field and a Unit Price field, a calculation field called Line Total can calculate the total by multiplying quantity by unit price.
Summary	A field type that aggregates values (e.g., total for a group, average for a group) across a found set of records, and possibly for each subgroup within a sorted found set.

LESSON 7

Section 3: Create New Fields from the Field Picker

Only available in **Layout** mode, the **Field Picker** provides a useful visual display of all your existing fields in an inspector-like interface right next to your layout. To add fields to your layout, simply select, drag, and drop a field onto it in the desired location. You can also use the **Field Picker** to create new fields and drag them directly onto your layout.

Equipment Providers, Inc. wants to provide a way for customers to sign a form verifying that their equipment was delivered. For the Equipment Rentals file, you will need to add a container field so that customers can enter their signature when they receive equipment.

Container fields in FileMaker solutions can store and enable interaction with these types of files:

- Images
- Video or audio files
- Files of any type, including Word, Excel, and PDF

Activity 7.1: Creating a New Container Field from the Field Picker

In the Equipment Rentals file, users need to gather customers' signatures when an asset is delivered. Use the **Field Picker** to create a Signature field for the Asset table.

1. Navigate to the **Assets** layout and enter **Layout** mode.
2. Click the **Field Picker** button in the Status Toolbar to display the **Field Picker**, shown in Figure 26.

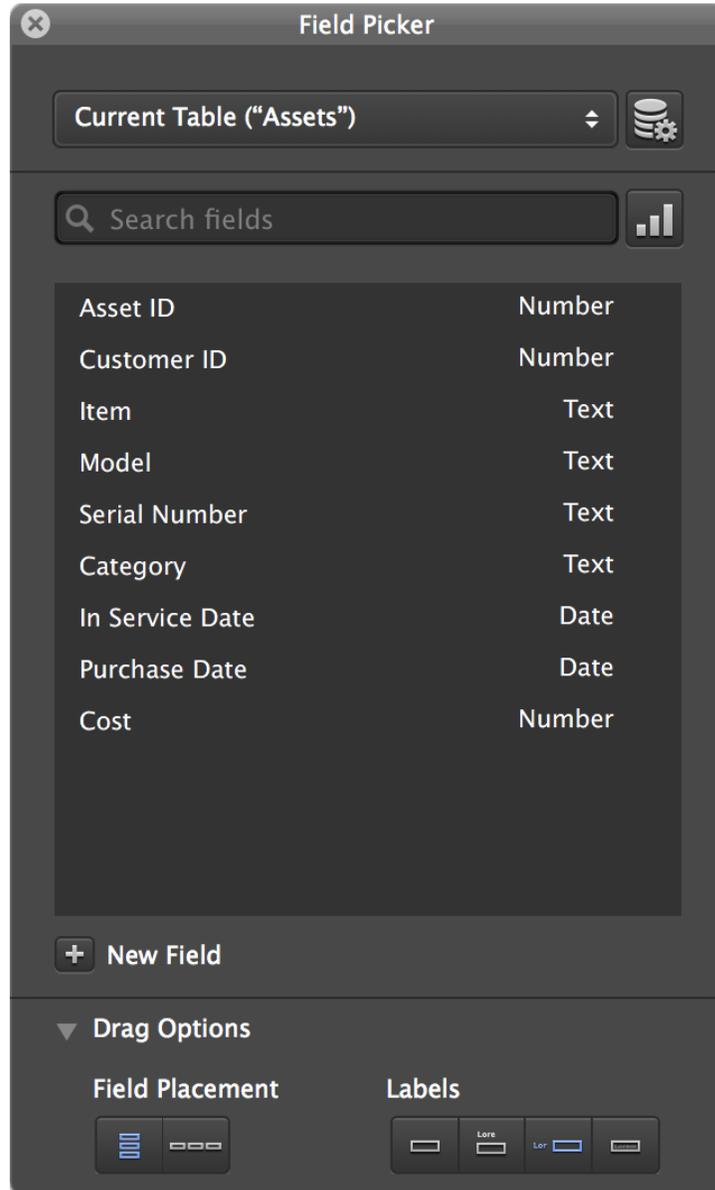


FIGURE 26

3. Click the icon labeled **New Field**.

4. Type "**Signature**" as the field name, select **Container** as the field type. You have now successfully created a **Container** field to store Customer signatures.
5. Drag the new **Signature** field out onto the layout and place it on the right side of the layout.

Lesson 7: Review Questions

1. Name four different types of fields you can create in FileMaker Pro.
2. What types of information can be stored in Container fields?
3. If you are editing a layout, what is the easiest way to create a new field?
4. If you are in the **Manage Database** dialog, how do you create a new field?

Lesson 7: Review Answers

1. Text, number, date, time, timestamp, container, calculation, and summary are the field types you can create in FileMaker Pro.
2. Container fields store binary data like images, signatures, PDFs, video or audio files, or other files.
3. The **Field Picker** is the easiest way to create a new field while editing a layout.
4. While on the Fields tab, type the name of the new field in the Field Name box, select a field type, and click Create.

Lesson 8

Relationships



Lesson 8: Relationships

Lesson Overview

Objectives

After this lesson, you will understand how to:

- Distinguish between one-to-many and many-to-many relationships.
- Use primary and foreign keys.
- Create table occurrences.
- Create relationships between tables.

FileMaker is a relational database management system, which means that you can create relationships between tables in order to reduce redundant data entry and improve data integrity.

The **Getting Started Tour** in FileMaker Pro introduced the basic concept of relationships. In this lesson, you will learn about the different types of relationships and what is needed to create a relationship in FileMaker Pro.

Here is what you learned from the **Getting Started Tour**.

Creating Solutions > Relationships

- Relationships connect data stored in different tables in a database.

- You can enter data once, then view and use that data in related tables or files.
- A portal is a layout object that displays data from related tables.

Relationship Types

Now that you have learned how to create tables and fields, you can link together related information from those different tables. A relational database reduces the need to enter the same data multiple times or in multiple places.

For example, in the Equipment Rentals file, customer information is stored once in the Customer table. When an Asset is linked to a Customer, the user can view the related information from the Customer record. This saves the user from having to enter that Customer information again. Also if the user updates the customer's contact information, the new information will be available for all Assets.

The most common relationship types in a relational database are one-to-many and many-to-many.

One-to-many

This is the most common type of relationship. Consider the **Equipment Rentals** solution:

- Each Customer may potentially have many Assets.
- Each Asset is associated with only one Customer.

The relationship between Customers and Assets is a one-to-many relationship.

When depicting the relationships between entities, there are some commonly used notations. As shown in Figure 27, a line is used to connect boxes representing the two entities, with a crow's foot at the end that represents the "many" side of the relationship.

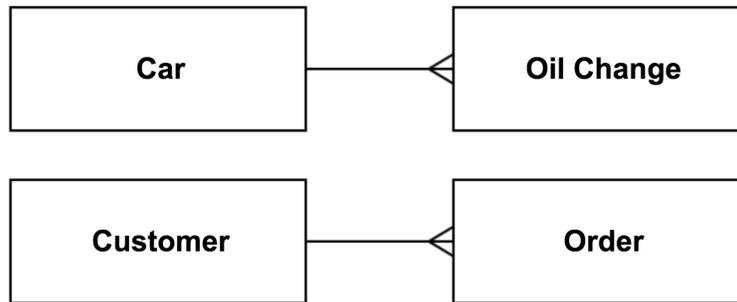


FIGURE 27

These relationships can be described as follows:

- One car may have many oil changes over time; an oil change is performed on one car.
- One customer may place many orders over time; each order is placed by a single customer.

Many-to-many relationships

Now consider a solution that tracks movies and actors. What is the relationship between actors and movies?

- One actor may act in many movies over time.
- One movie has roles for many actors.

In this case, the relationship is many-to-many, as shown in Figure 28.

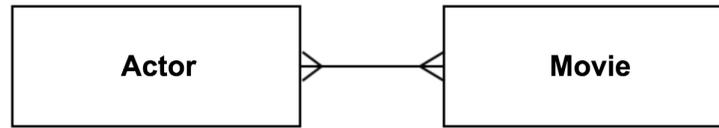


FIGURE 28

Identifying Relationship Types

It is not always obvious whether a relationship is one-to-many or many-to-many. The correct answer may depend on the specifics of the situation you are trying to capture. Suppose you have a solution that tracks paintings and artists. You may assume that the relationship between artist and painting is one-to-many:

- One artist may create many paintings.
- Each painting is created by only one artist.

The first point seems obvious. What about the second? If the solution tracks projects like community murals, the second point may not be correct—many artists could contribute to one painting. If you are tracking student paintings from a class, then you may need to think about paintings started by a teacher and finished by the student. The relationship may be better modeled as many-to-many.

LESSON 8

Section 1: Using Primary and Foreign Keys to Relate Tables

When relating tables, it is important to uniquely identify each record. By having a unique identifier, you will be able to create relationships between tables. Also, it is useful to be able to reference any given record by a unique identifier when troubleshooting a database.

For example, invoices from service providers have an Invoice Number and this is often the unique identifier. This provides both the customer and the service provider with a way to easily reference the same invoice.

Primary Keys

A field that uniquely identifies a record in a table is called a *primary key*. It is recommended that you create a primary key in every table. A primary key should follow these rules:

- Be unique for every record in the table
- Never change
- Never be empty

It is good practice to allow FileMaker Pro to create the primary key values automatically, ensuring that the three rules above are followed. Note that the data you imported into the Customers and Assets tables already contained

primary keys: **Customer ID** and **Asset ID**, respectively. The primary key values were manually entered in the spreadsheet, but FileMaker Pro can automatically assign these values for future Customers and Assets.

Activity 8.1: Adding an Auto-Enter Field Option to Primary Keys

You will modify the existing primary key fields to auto-enter a serial number for future new records.

1. Open the **Manage Database** dialog and click on the **Fields** tab. Make sure the **Customers** table is selected.
2. Double click on the **Customer ID** field to bring up the **Field Options** dialog.
3. On the **Auto-Enter** tab, activate the **Serial number** option (by entering a checkmark in the checkbox next to **Serial number**).
4. The highest Customer ID from the imported data is 112 for Williams Design Studio. Change the **next value** to 113, as shown in Figure 29 to make sure the values in this field are always unique.
5. Activate **Prohibit modification of value during data entry** (at the very bottom) to prevent users from modifying the primary key. Click **OK**.

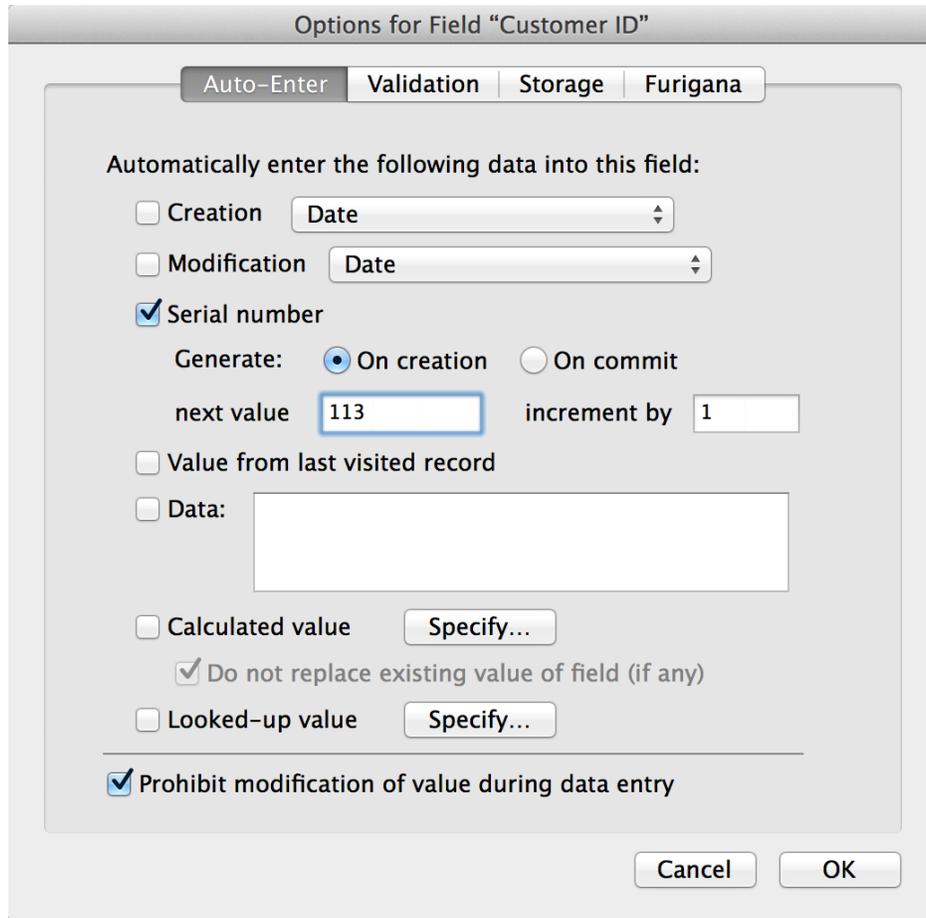


FIGURE 29

6. Change the list of fields to the **Assets** table.
7. Double click on the **Asset ID** field. Repeat step 3, 4, and 5 above, but change the **next value** to 1984.

Foreign Keys

While a primary key is an attribute that allows you to uniquely identify a Customer, how can it be used to link a Customer to one or more Assets? For the relationship to be established, a field must be created in the Asset table. You

can assign a Customer to an Asset by entering the Customer's primary key value into an Asset record, thereby providing a link between the two tables. The term for this type of field is a *foreign key*.

When thinking about a one-to-many relationship, the "many" side will always contain the foreign key. In the Equipment Rentals file, the Asset table requires a customer foreign key.

The foreign key, **Customer ID**, has already been created in the Asset table.

LESSON 8

Section 2: Creating Relationships

The **Relationships** tab of the **Manage Database** dialog contains the **Relationships Graph**. It provides a way to graphically represent and specify relationships among the tables in your database.

Each box on the graph is called a table occurrence (TO). Think of a TO as an alias or shortcut to a table. To check the source table for a TO, hover your mouse over the small arrow left of the name of the TO, as shown in Figure 30. Because you can create multiple TOs based on the same table, you can create many different relationships between any two tables.

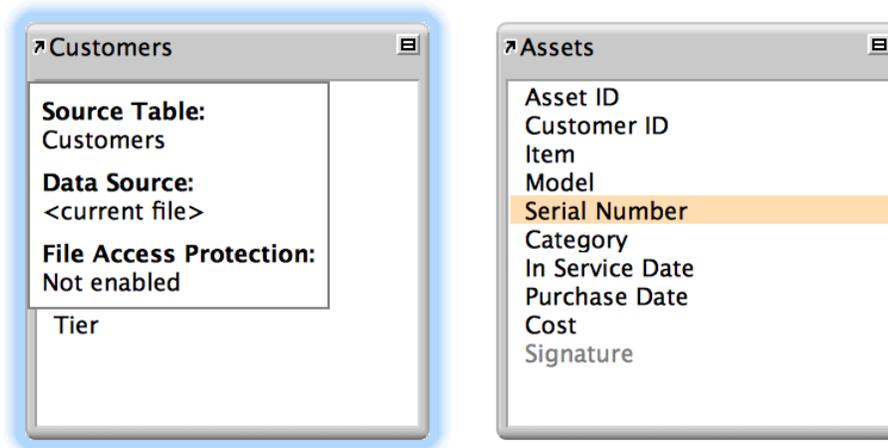


FIGURE 30

Creating Relationships

With primary keys and foreign keys created in the Equipment Rentals file, the database is properly setup to create relationships between tables.

Activity 8.2: Creating a Relationship

You will set up a relationship between the Customers and Assets tables.

1. Navigate to the **Relationships** tab of the **Manage Database** dialog.
2. Click and drag from the **Customer ID** field in Customers to the **Customer ID** field in Assets. Your relationships graph will look like Figure 31.

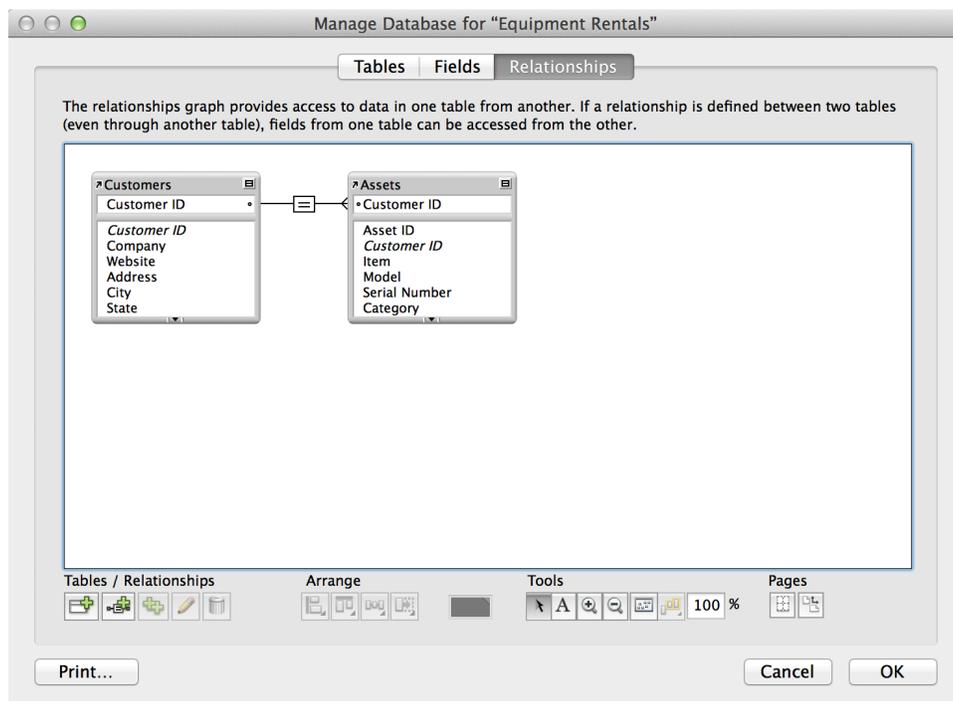


FIGURE 31

3. Click **OK** to close the **Manage Database** dialog.

A relationship has now been created between the primary key in the Customers table and the corresponding foreign key in the Assets table. This will allow you to associate any number of Assets with a given Customer.

Lesson 8: Review Questions

1. What are the two most common types of relationships?
2. What is the type of relationship between the following:
 - Actors and Movies
 - Songs and Concerts
 - Aircrafts and Inspections
 - Race and Swimmer
3. What field should you create in every table of your FileMaker solution?

Lesson 8: Review Answers

1. One-to-many and many-to-many are the most common relationships.
2. The relationships are:
 - Many-to-many
 - Many-to-many
 - One-to-many
 - Many-to-many
3. You should always add a primary key field to every table.

Lesson 9

Layouts



Lesson 9: Layouts

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Create layouts for specific devices.
- Add fields to layouts.
- Apply styles and themes to layouts.

Layouts provide the canvas for creating your user interface. Whether you will present forms, lists, reports, charts, or complex workflows, layouts are the way to present information and actions for your users.

A layout consists of:

- A layout area

- Objects such as fields, web viewers, tab controls, etc.
- A single theme and various styles

Here is what you learned from the **Getting Started Tour**.

Creating Solutions > Themes & Styles

- Themes provide coordinated colors, fonts, and other styling for layouts.
- Some themes are specially designed for iOS devices.

LESSON 9

Section 1: Creating Layouts

A layout organizes how you see information in a FileMaker solution. Whether you are entering data or printing reports, the layout handles how the data is displayed. Layouts do not store data. You can create many layouts to see the same record—or set of records—in different ways.

Each layout is tied to a table occurrence, which is considered the layout's “context.” Each layout is associated with one table occurrence on the Relationships Graph.

In order to create, view, and modify layouts, you need to be in **Layout** mode. In addition to the standard ways of switching modes—the **View** menu and the pop-up menu in the bottom left of the document window—FileMaker also has an **Edit Layout** button at the bottom right of the Status Toolbar when viewing a layout in **Form** or **List** view, shown in Figure 32.

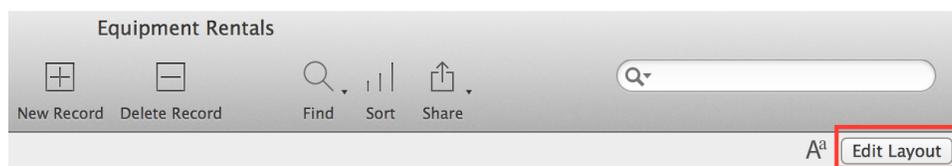


FIGURE 32

Activity 9.1: Creating a New Layout

You will create a layout in **Equipment Rentals.fmp12** that displays data from the Customers table for use with FileMaker Pro on a desktop or laptop computer.

1. Choose **View > Layout Mode**, or use the keyboard shortcut **Command-L** (OS X) or **Ctrl-L** (Windows) to enter **Layout** mode.
2. Choose **Layouts > New Layout/Report**, or click the **New Layout/Report** button in the Status Toolbar, or use the keyboard shortcut **Command-N** (OS X) or **Ctrl-N** (Windows).
3. Choose the **Customers** table occurrence on the **Show records from:** drop-down list.
4. Change the layout name to "**Customer Details**".
5. Click on **Computer** since the new layout will be viewed using FileMaker Pro on a desktop computer.
6. Choose **Form** so that the layout will show one record at a time, as shown in Figure 33. Click **Finish**.

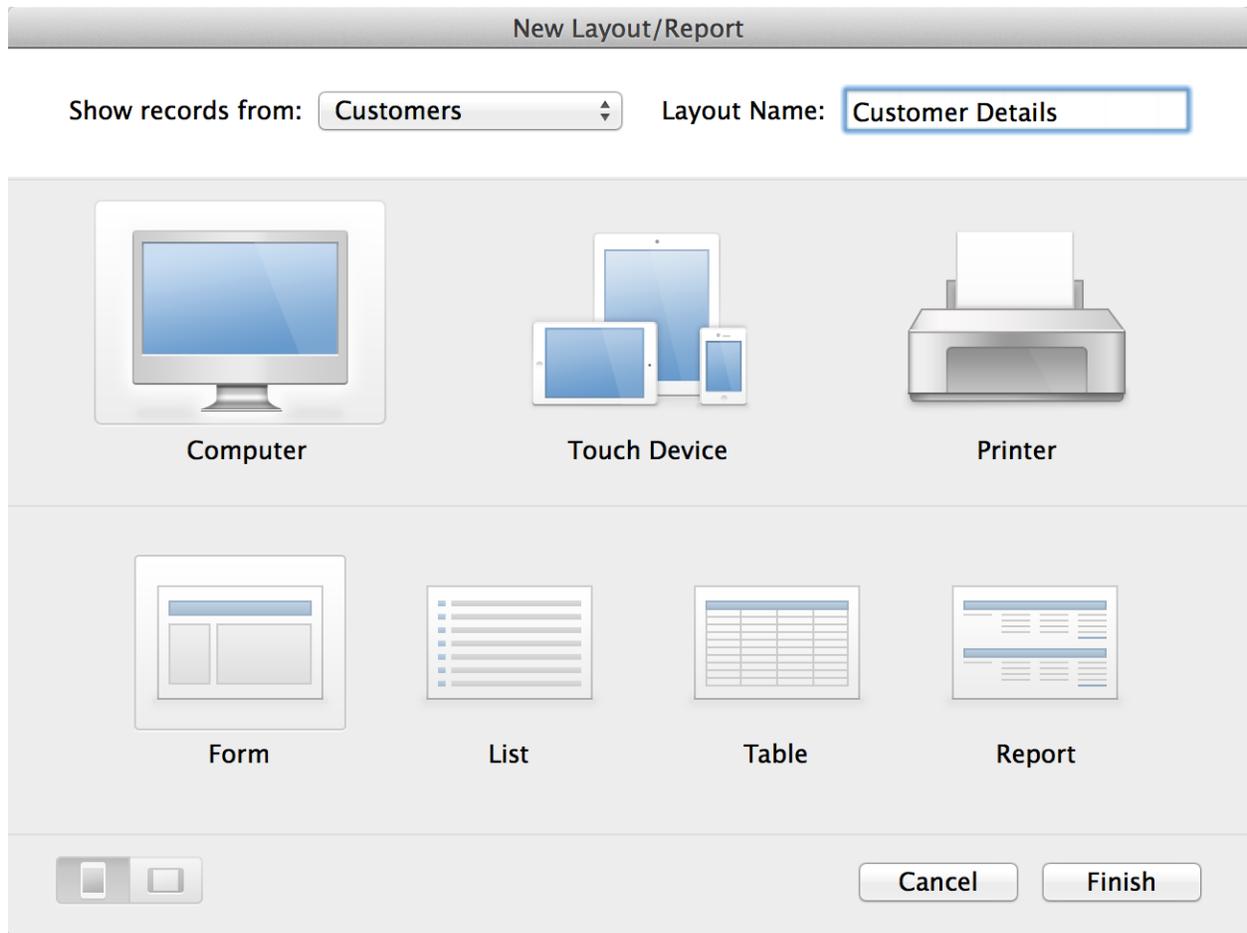


FIGURE 33

Layout Parts

FileMaker layouts are divided into layout parts. The three most used parts are the header, body, and footer. These different sections of the layout control how and where data, text, and graphics are displayed. For example, text placed in a header part prints at the top of each page, while text placed in the body part appears once for each record.

When you create a new layout, it automatically has one or more parts depending on the choices you made in the **New Layout/Report** dialog. Each layout must

have at least one part. In **Layout** mode, a gray horizontal line marks the division between layout parts. You can resize a part by dragging the line up or down. You will learn more about Layout Parts in Lesson 16: Reporting.

LESSON 9

Section 2: Adding Fields to a Layout

When you create a new layout by clicking on **New Layout/Report**, the layout will not have any fields, which means no data will be visible. Depending on the needs of your users and how they plan on using the layout, it may contain as few or as many fields as is necessary.

Activity 9.2: Adding Fields to a Layout Using the Field Picker

Equipment Providers, Inc. needs a layout that will include all of the customer information. You will use the **Field Picker** to add fields to the **Customer Details** layout.

1. Click the **Field Picker** button in the Status Toolbar, or use the keyboard shortcut **Command-K** (OS X) or **Ctrl-K** (Windows). The **Field Picker** will appear, shown in Figure 34.

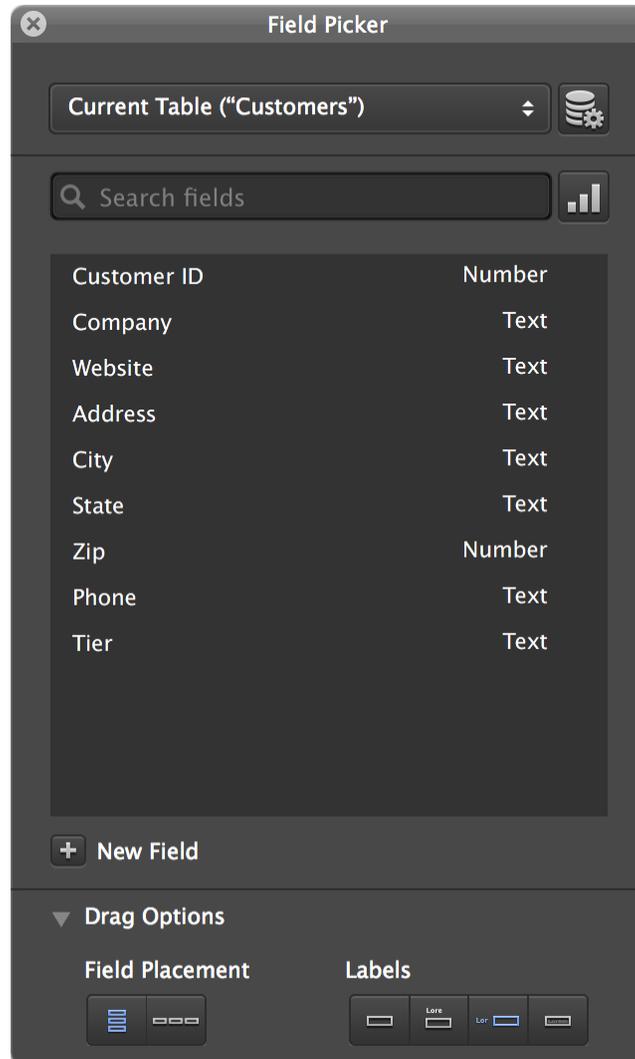


FIGURE 34

2. Click on the **Customer ID** field. Hold down the **Shift** key and click on the last field, **Tier**. All fields will now be highlighted.
3. Drag the selected fields to the layout. This will add the fields along with a field label, based on the field name, as shown in Figure 35.
4. Enter **Browse** mode (save your changes to the layout, if prompted), and flip through a few records.

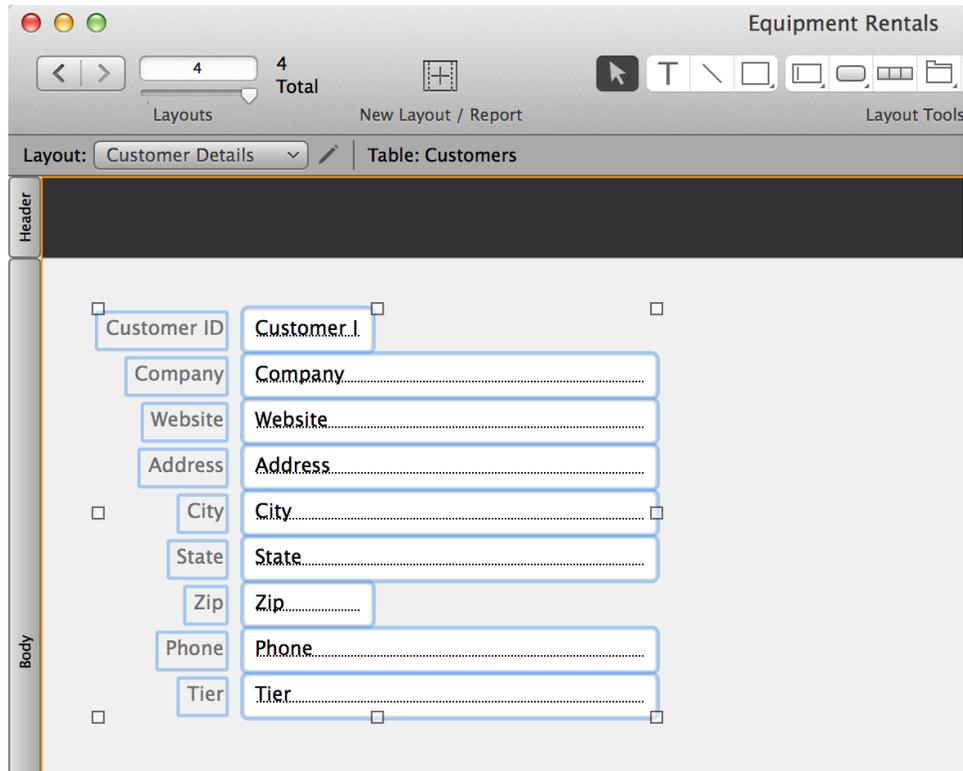


FIGURE 35

Selecting Fields from Field Picker

If you want to select multiple fields that are grouped together in the **Field Picker**:

- Click on the first field
- Hold down the **Shift** key
- Click on the last field

If you want to select multiple fields that are not grouped together:

- Hold down the **Command** (OS X) or **Control** (Windows) key
- Click on each field

LESSON 9

Section 3: Layout Themes and Styles

Themes

Themes help create a visually attractive user interface by providing consistent styles for buttons, fields, background, and other objects on a layout. Themes apply predefined fonts, sizes, colors, padding, and other styling to your layout objects.

When you select a new theme for a layout, all existing layout objects adopt the new theme's styles. Object positions, however, remain fixed, so it may be necessary to adjust some of the objects manually depending on the theme selected. It is recommended that you experiment with several themes before you choose one.

Note: A theme called **Enlightened** is the default theme for any new file you create or a file that has been created from an Excel spreadsheet.

Activity 9.3: Changing the Theme

You will choose a theme that will be used throughout all the layouts for the Equipment Rentals file.

1. From the **Customer Details** layout, enter **Layout** mode.

- Choose **Layouts > Change Theme...** or use the **Change Theme**  button in the layout bar. A popup will appear showing you all the themes available, shown in Figure 36.

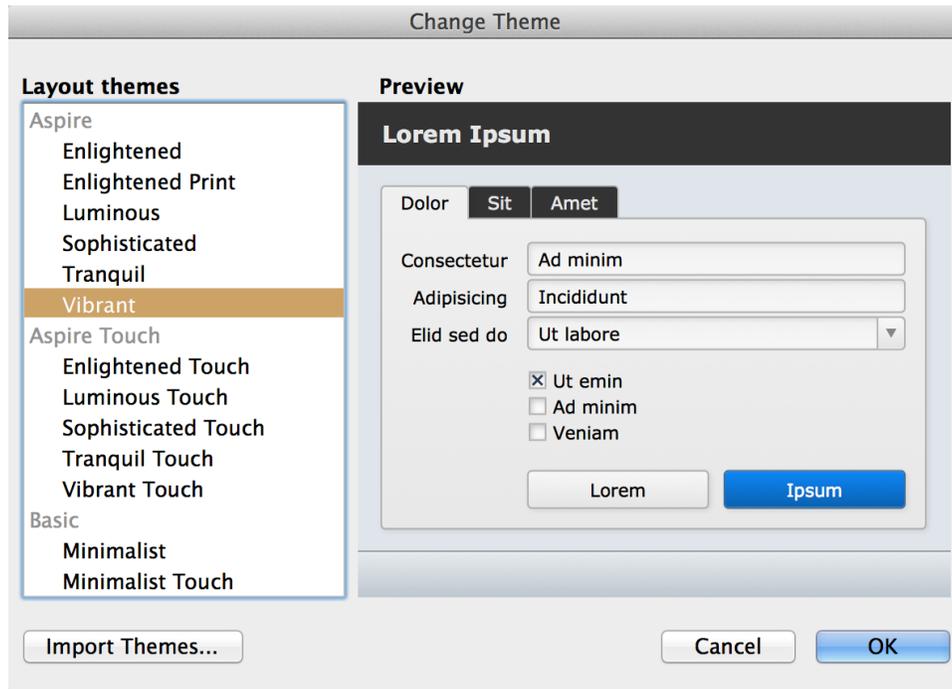


FIGURE 36

- Select the **Vibrant** theme and click **OK**.

The formatting of all objects on the layout will change to match the defaults of the **Vibrant** theme.

FileMaker also contains a set of themes with the suffix “**Touch**.” These themes are specifically designed for layouts built for iOS devices. Each of these themes use recommendations from Apple’s [iOS Human Interface Guidelines](https://developer.apple.com/design/human-interface-guidelines/) by making fonts larger and buttons bigger for easier use on iOS devices. When developing a solution for iOS, it is recommended that you use a **Touch** theme.

Styles

Each theme comes with a set of styles for each object type. Styles allow you to easily define consistent and reusable formatting, applying it to objects on a single layout or across all layouts. All formatting options found in the **Inspector** can be used when defining a style. You can even use an image for the background of an object and save that as part of the style.

Styles are part of the overall layout theme. Within a theme, each type of layout object may have many available styles. For example, a button object may have default, accent, and navigation styles among others. Each object on a layout has a style assigned to it. Upon assigning a style to an object, it is formatted according to the style.

You can edit existing styles as well as create new styles. Changes to existing styles can be applied to all objects with that style on the current layout or to all objects with that style on every layout that uses the same layout theme.

Utilizing consistent themes and styles throughout your solution can make updating the look and feel of your solution quick and easy. You can access styles by going to the **Styles** tab on the Inspector while in **Layout** mode, as shown in Figure 37.

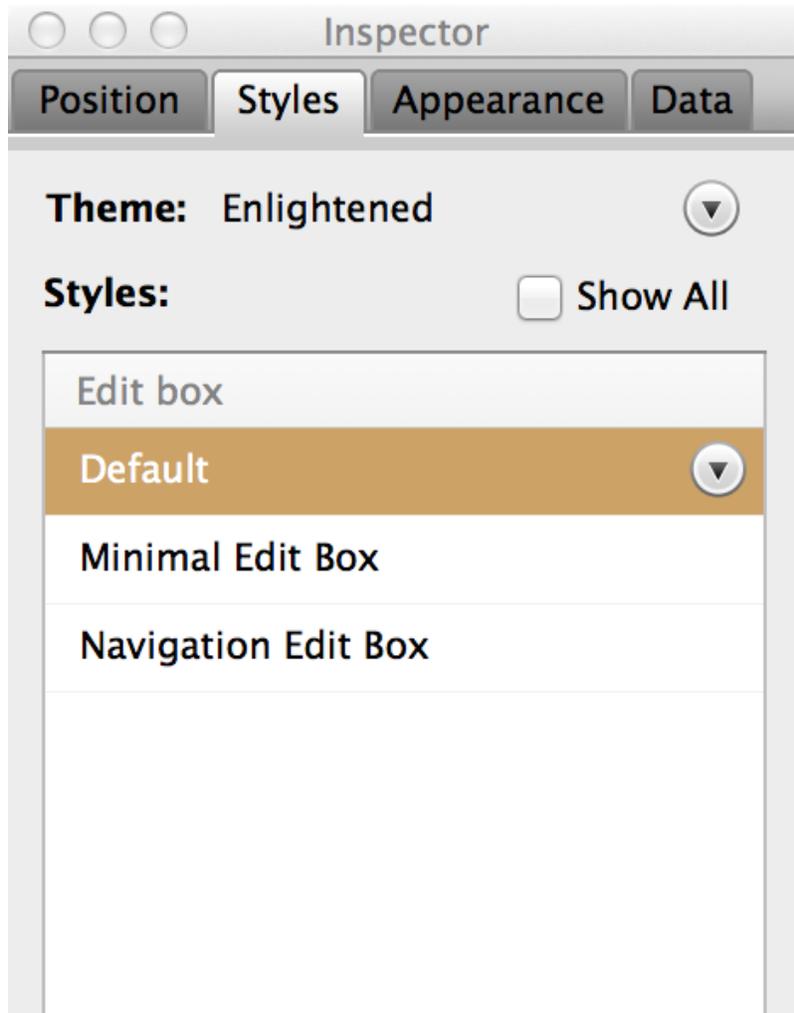


FIGURE 37

LESSON 9

Section 4: Creating More Layouts

It is common to have different views of the same data. For example, while the Customer Detail is helpful in the Equipment Rentals file, the solution can benefit from a Customer List as well. With the **Customer List (List view)**, a user can scroll and see essential data about multiple Customers at once. With **Customer Details (Form view)**, the user can see each customer's full details one at a time.

Activity 9.4: Creating a List View Layout

1. Enter **Layout** mode and create a new layout.
2. **Show records from** the **Customers** table and name the layout “**Customer List**”.
3. Select **Computer** and **List**, then click **Finish**.
4. Open the **Field Picker** and change the **Drag Options** to place fields horizontally with labels above the field like Figure 38.

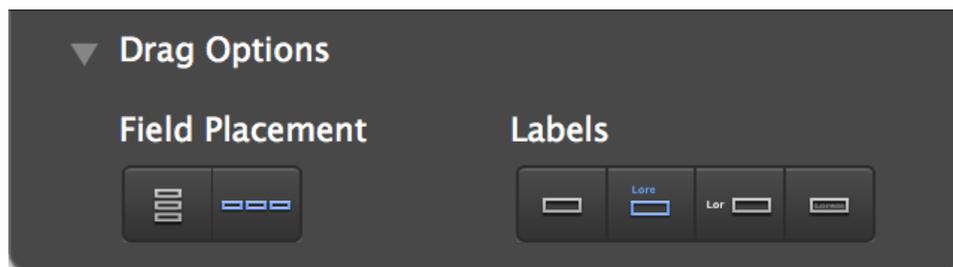


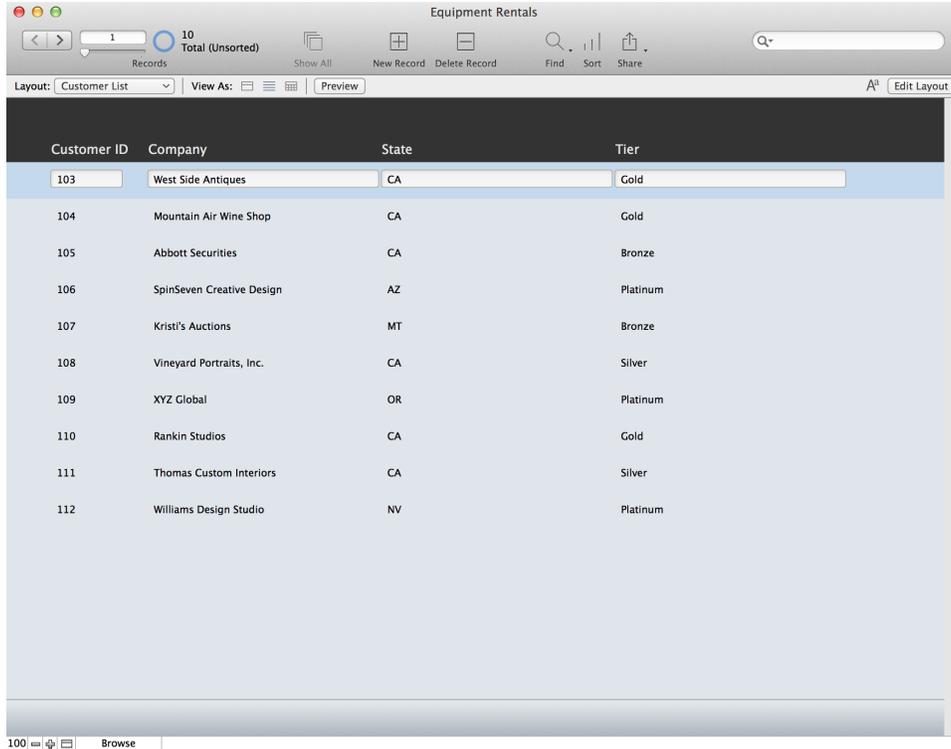
FIGURE 38

5. Add the following fields to the layout with the **Field Picker**:

- Customer ID
- Company
- State
- Tier

You can select multiple fields by holding **Command** (OS X) or **Control** (Windows) while clicking. Place the objects on the layout so that the labels are in the Header and the fields are in the Body.

6. If necessary, select the labels and change their font color to white by clicking on **View > Formatting Bar** or by clicking the  button in the layout bar. (You may need to change the format and space out the fields and labels to avoid overlapping. Select and move the objects around so that your layout, in **Browse** mode, looks like Figure 39. For more details on moving objects, see Lesson 10.)



The screenshot shows the FileMaker 14 interface for a database named "Equipment Rentals". The window title is "Equipment Rentals". The top toolbar includes navigation and record management icons: back, forward, records (10 Total (Unsorted)), Show All, New Record, Delete Record, Find, Sort, and Share. Below the toolbar, the layout is set to "Customer List" and the view is in "Preview" mode. The main area displays a table with the following data:

Customer ID	Company	State	Tier
103	West Side Antiques	CA	Gold
104	Mountain Air Wine Shop	CA	Gold
105	Abbott Securities	CA	Bronze
106	SpinSeven Creative Design	AZ	Platinum
107	Kristi's Auctions	MT	Bronze
108	Vineyard Portraits, Inc.	CA	Silver
109	XYZ Global	OR	Platinum
110	Rankin Studios	CA	Gold
111	Thomas Custom Interiors	CA	Silver
112	Williams Design Studio	NV	Platinum

At the bottom of the window, there is a "Browse" button and a status bar showing "100" and a magnifying glass icon.

FIGURE 39

With the two Customer layouts you created, **Customer List** and **Customer Detail**, users will be able to see a little bit of data about multiple customers or a lot of data about one specific customer.

In addition to these, users will want a list of Assets in your solution. Let's add that now.

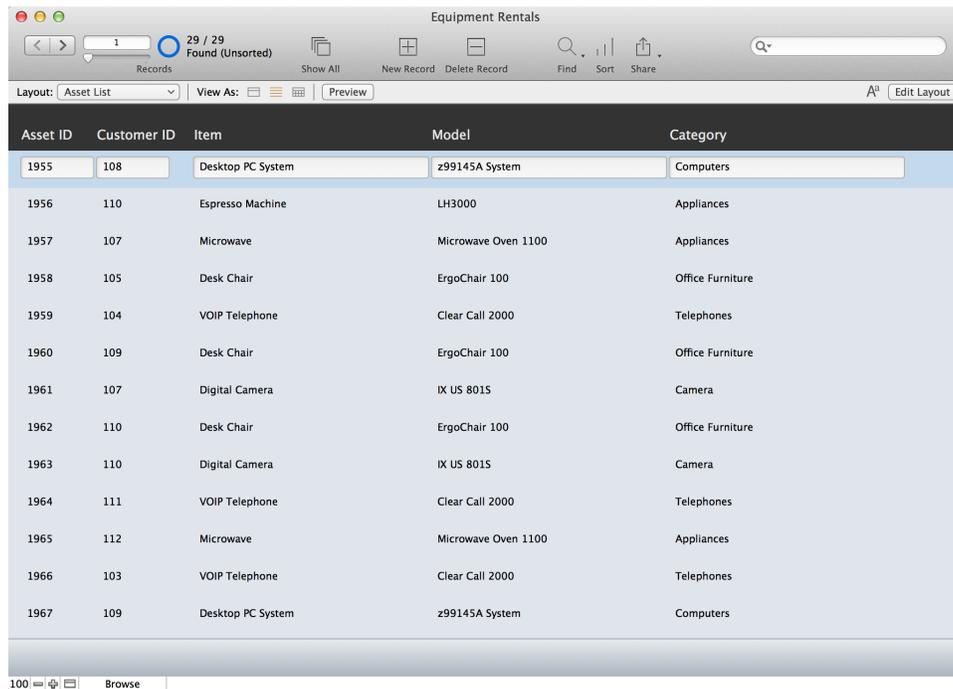
Activity 9.5: Creating an Asset List

Similar to Activity 9.4, you will create a **List** view layout. In this activity, the layout will show a list of Assets.

1. Enter **Layout** mode and create a new layout.
2. **Show records from** the **Assets** table and name the layout "**Asset List**".

FileMaker Training Series: Basics for FileMaker 14

3. Select **Computer** and **List**, then click **Finish**.
4. Add the following fields to the layout with the **Field Picker**:
 - Asset ID
 - Customer ID
 - Item
 - Model
 - Category
5. As in Activity 9.4, you may need to space out the objects on the layout to keep their labels from overlapping. Enter **Browse** mode. Your layout should look similar to Figure 40.



Equipment Rentals

Records: 29 / 29 Found (Unsorted)

Layout: Asset List | View As: [List View] [Table View] [Preview] | A⁹ Edit Layout

Asset ID	Customer ID	Item	Model	Category
1955	108	Desktop PC System	z99145A System	Computers
1956	110	Espresso Machine	LH3000	Appliances
1957	107	Microwave	Microwave Oven 1100	Appliances
1958	105	Desk Chair	ErgoChair 100	Office Furniture
1959	104	VOIP Telephone	Clear Call 2000	Telephones
1960	109	Desk Chair	ErgoChair 100	Office Furniture
1961	107	Digital Camera	IX US 8015	Camera
1962	110	Desk Chair	ErgoChair 100	Office Furniture
1963	110	Digital Camera	IX US 8015	Camera
1964	111	VOIP Telephone	Clear Call 2000	Telephones
1965	112	Microwave	Microwave Oven 1100	Appliances
1966	103	VOIP Telephone	Clear Call 2000	Telephones
1967	109	Desktop PC System	z99145A System	Computers

100 | Browse

FIGURE 40

Lesson 9: Review Questions

1. In which mode can you create layouts?
2. What are the device options when creating a new layout?
3. What tool allows you to quickly add multiple fields to a layout?
4. Which themes are better suited for iOS devices?

Lesson 9: Review Answers

1. All layouts are created in **Layout** Mode.
2. Computer, touch device, and printer.
3. The **Field Picker**.
4. Any theme with the suffix "**Touch**".

Lesson 10

Layout Design Tools



Lesson 10: Layout Design Tools

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Style objects with the Inspector.
- Select, move, and resize objects.
- Turn on Grids and Guides.
- Create layouts built and sized for iOS devices.

Once layouts are created, the next step is to place objects on the layout and style them appropriately. It is important to make interfaces that are consistent and easy for users to understand. Small inconsistencies within or between your layouts distract your users, causing them to assess whether the difference they are observing has a meaning in the interface or is just accidental. Grids, Guides,

and Stencils are some of the tools available in FileMaker Pro to aid developers in creating the best experience possible for their users.

Here is what you learned from the **Getting Started Tour**.

Creating Solutions > Layout Objects

- Layout objects are elements placed on a layout. They enable users to view and interact with data.
- You can select, move, resize, delete, copy, format, name, and change objects.

Creating Solutions > Layouts

- FileMaker Pro includes tools to create beautiful layouts for easy data entry and analysis
- You can customize layouts by editing objects, positioning and arranging them, resizing them, and making other changes to their appearance.

LESSON 10

Section 1: Status Toolbar and Inspector

In **Layout** mode, the Status Toolbar provides quick and easy access to many of the tools used for building layouts. These tools, shown in Figure 41, allow you to create new layout objects and apply colors and styles to existing objects.

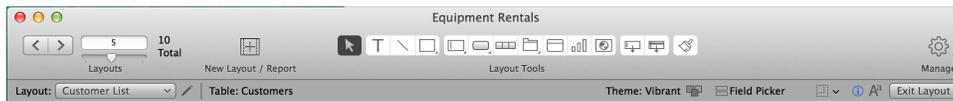


FIGURE 41

The bottom row of the Status Toolbar is called the **Formatting Bar**. If it is not displayed, you can activate it by clicking on **View > Formatting Bar** or by clicking the  button in the layout bar.

The toolbar includes standard text and drawing tools similar to those in other applications. For example, to add a box to a layout, click the **Rectangle** tool, then click and drag to draw the box on the layout.

Inspector

The **Inspector** is the object control center where you can view and modify the settings for all objects on a layout. Each of the four panes of the Inspector—

Position, Styles, Appearance, and Data—focuses on a different aspect of formatting (Figure 42).

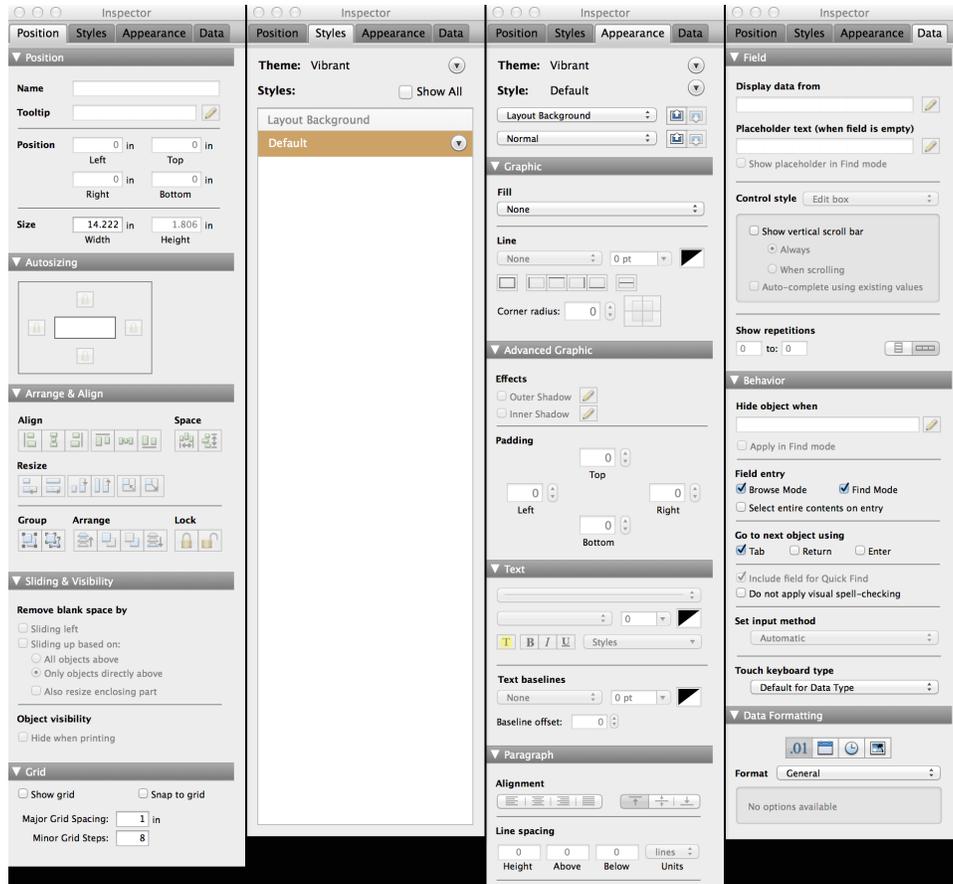


FIGURE 42

You can open an **Inspector** by using any of these methods:

- Choose **View > Inspector** (or **View > New Inspector** for multiple Inspectors).
- Click the  button in the layout bar.
- Use the keyboard shortcut **Command-I** (OS X) or **Ctrl-I** (Windows).

You can quickly switch to an **Inspector** tab by using the keyboard shortcuts **Command-1, 2, 3, and 4** (Mac OS) or **Ctrl-1, 2, 3, and 4** (Windows).

LESSON 10

Section 2: Layout Resizing

A number of tools help you manage the size of your layouts and the objects they contain. This becomes useful when duplicating a layout meant for one device and modifying it to suit another, such as taking an iPad layout and expanding it for the desktop.

Layout Width

To set the width of a layout, drag the dark gray line that represents the right edge of the visible layout area. This defines the area where objects will be seen in **Browse** mode. Any object placed outside of the layout's defined width is treated as an invisible object in **Browse** mode.

Screen Stencils

When you are creating solutions for different platforms and screen sizes, FileMaker Pro contains a set of screen stencils that you can use for accurate layout sizing. You can easily optimize layouts for iOS devices by using a stencil.

Each stencil shows the borders of the specific iPad or iPhone form factor in both portrait and landscape orientation to aid in design. The stencils can be turned on or off in the formatting bar. You can turn on multiple stencils at the same time

for cross-platform solutions or for multi-orientation devices such as iPhone and iPad. Figure 43 shows a layout with one iPhone stencil turned on.

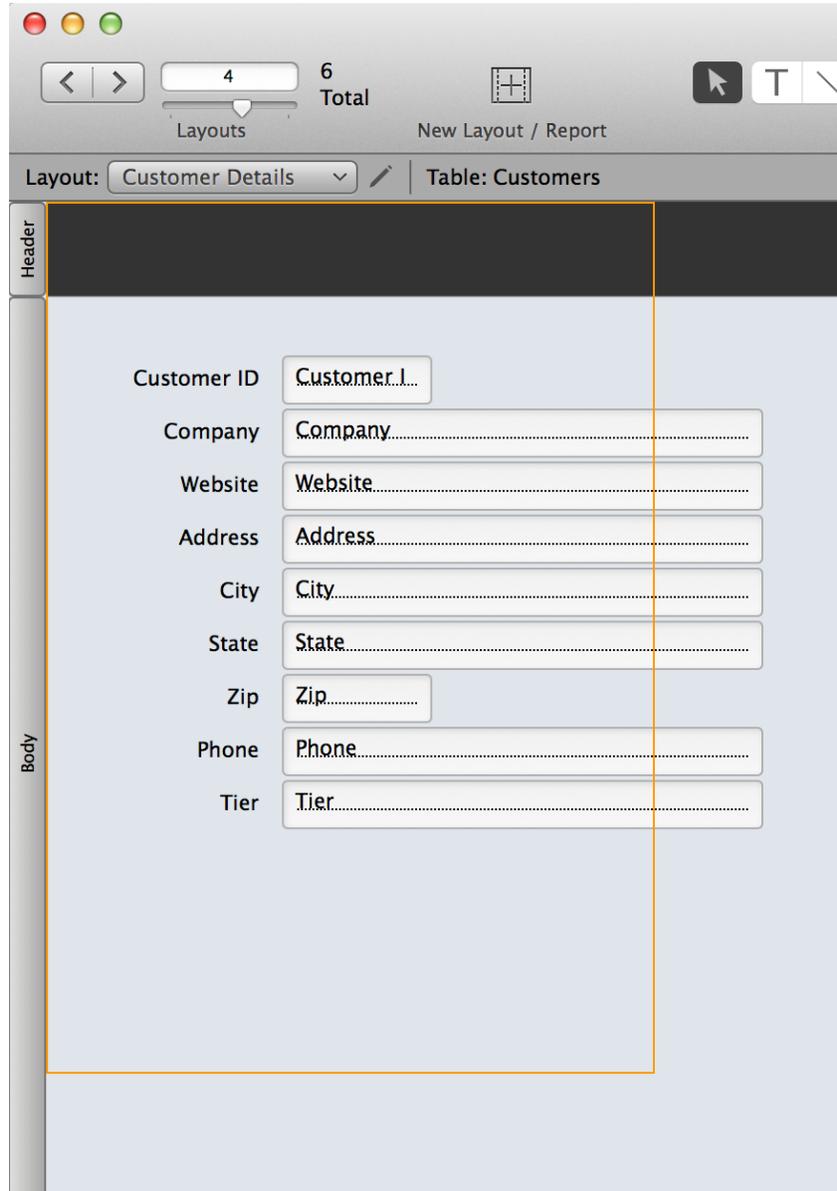


FIGURE 43

To toggle the screen stencils, click the stencil icon on the right side of the Status Toolbar, shown in Figure 44. Clicking the arrow will provide you with a list of

stencils that can be turned on or off, including different desktop resolutions, iPhone, iPad, and a custom size.

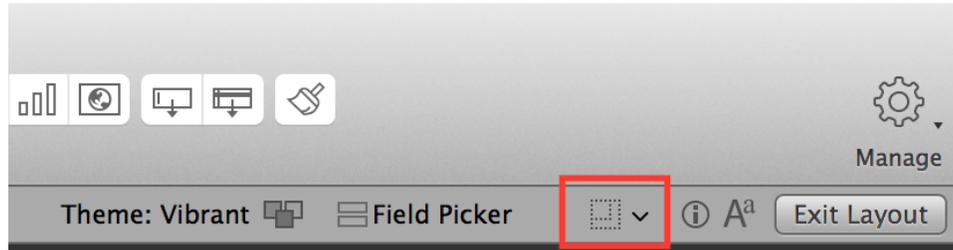


FIGURE 44

Selecting, Resizing, and Moving Objects

To select a layout object, click on the object (for example, any field in the Equipment Rental file is considered an object). You will see small squares, called handles, that represent the corners and sides of the object.

You can change the size of an object by dragging any of the handles. If multiple objects are selected while dragging the handles, the objects will all resize with respect to each other. This is very useful, especially when resizing a group of fields and other layout objects.

You can move an object that you have selected by dragging any part of the object other than its handles. To move an object a small distance, select it, then use the arrow keys on the keyboard to move an object one point (pt) at a time.

LESSON 10

Section 3: Guides and Grids

Dynamic Guides

Guides help you align objects on a layout during your solution creation process. The two types of guides are dynamic guides and ruler guides.

Dynamic guides enable you to define the position and size of objects based on other objects on your layout. As you move or resize an object, blue lines appear to indicate that the object you are changing is aligned to other objects.

Figure 45 shows the dynamic guides that appear as you move or resize an object on a layout.

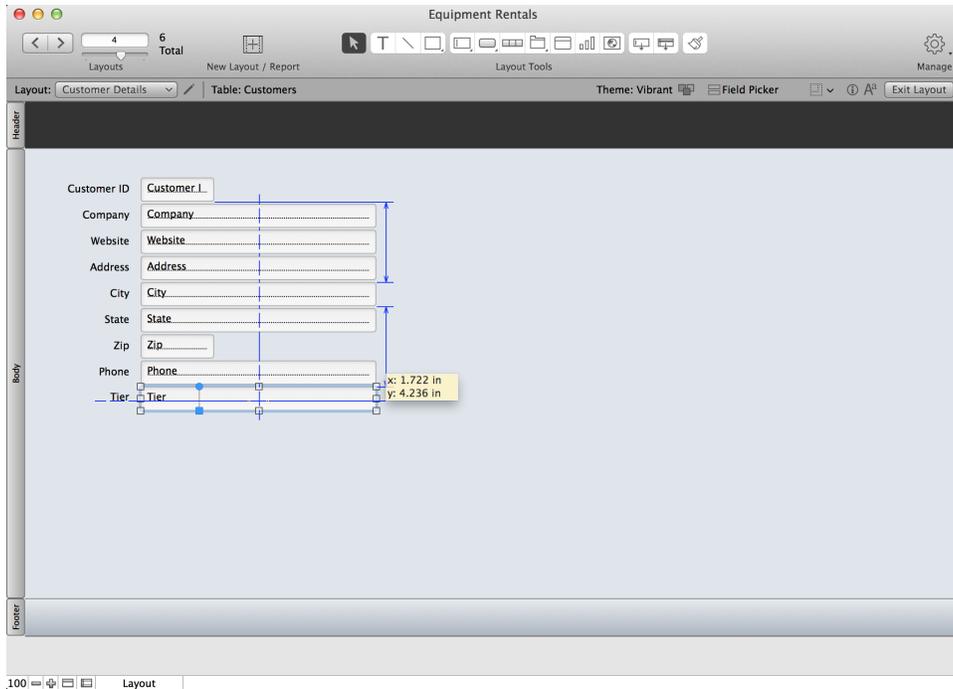


FIGURE 45

Ruler Guides

In order to position objects on your layout more precisely, turn on the page rulers (choose **View > Rulers**). To create a ruler guide, click either the top ruler for a horizontal guide or the left ruler for a vertical guide, and drag the guide onto the layout. Figure 46 shows a layout with two horizontal guides and three vertical guides.

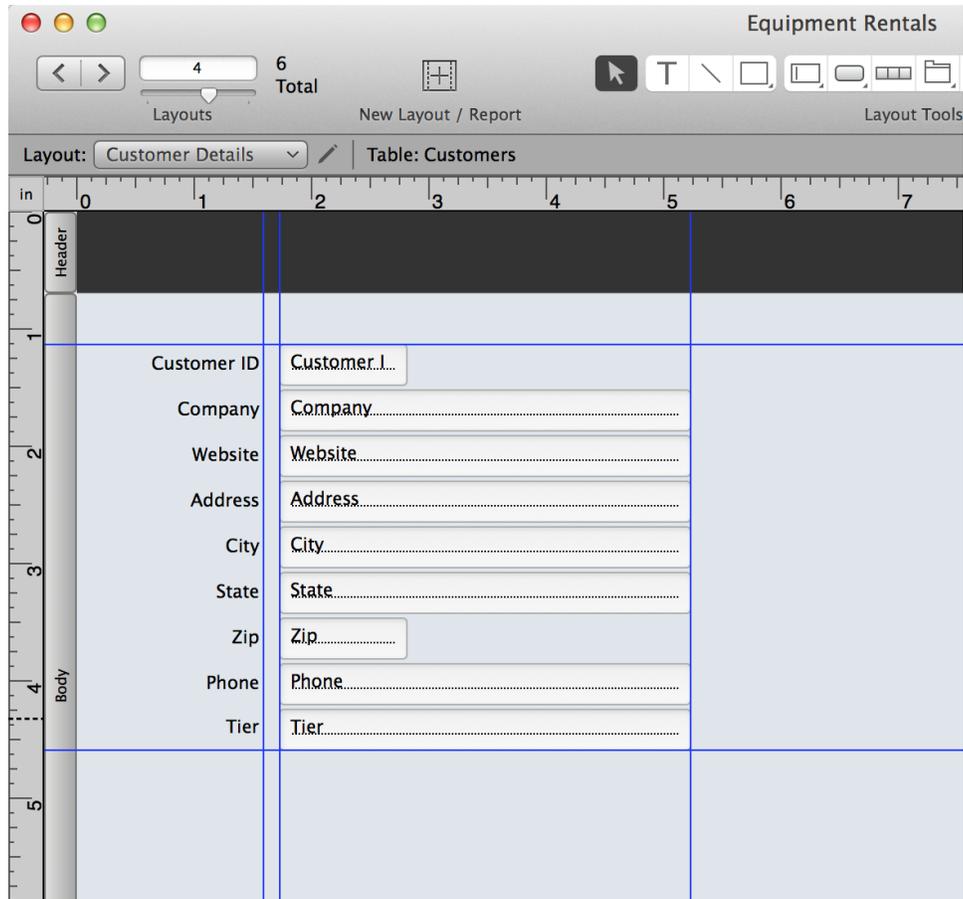


FIGURE 46

The **Snap to Guide** feature automatically aligns objects to the nearest guide when you move objects within a few points of the guide (activate by choosing **View > Guides > Snap to Guide.**)

Object Grid

In order to display a grid on your layout, turn on the **Object Grid**, which will show major and minor grid lines. Enable the **Object Grid** using either of these methods:

- Choose the **View > Grid > Show Grid**.
- Find it at the bottom of the **Position** pane on the **Inspector**.

When you check **Snap to grid**, moving or resizing objects on your layout will cause them to snap to the major and minor grid lines. You can change the increments at the bottom of the **Position** pane on the **Inspector**.

LESSON 10

Section 4: Using Layout Design Tools

Suppose that during the Equipment Providers, Inc. discovery phase, you learned that Assets may be given to a Customer during an on-site visit, and the user needs to collect a signature confirming that the Asset was received. Since FileMaker Go serves as a great tool for mobility and capturing signatures, you will need to create an Asset layout for iPhone and iPad.

Activity 10.1: Creating an iPad Layout

You will create a **Form** view layout that is appropriately sized for the iPad.

1. Click on **New Layout/Report**.
2. Base the layout on the **Assets** table occurrence and name it "**Asset Details - iPad**".
3. Choose **Touch Device**. Then choose **iPad**.
4. Choose **Form**. Click **Finish**.
5. Change the theme to **Vibrant Touch**.
6. Turn on the iPad (portrait) screen stencil.
7. Set the **Drag Options** to vertical fields in the **Field Picker** with the labels on the left.
8. Add the following fields to the layout with the **Field Picker**, within the stencil. In **Browse Mode**, your layout should look like Figure 47:

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- Asset ID
- Customer ID
- Item
- Model
- Serial Number
- In Service Date
- Purchase Date
- Cost
- Signature

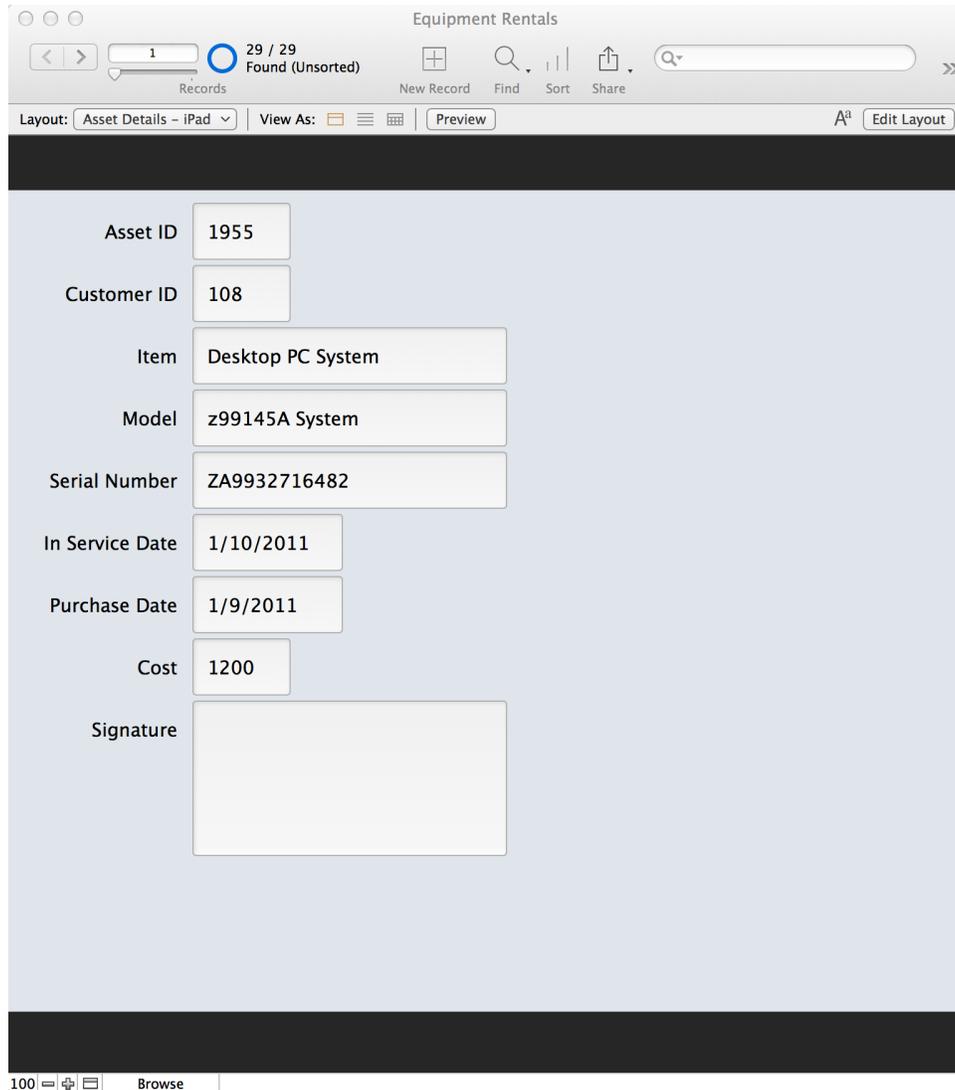


FIGURE 47

Activity 10.2: Creating an iPhone Layout

You will create a version of the Asset Detail layout that will be sized for an iPhone screen.

1. Create a **Form** view layout based on the **Asset** table called "**Asset Details - iPhone**". Choose **Touch Device**. Then choose **iPhone**. Choose **Form** and then click **Finish**.

2. Change the theme to **Vibrant Touch**.
3. Turn off the iPad screen stencils and turn on the iPhone (portrait) screen stencil.
4. In the **Field Picker**, set the **Drag Options** to vertically align fields with the label on top like Figure 48.

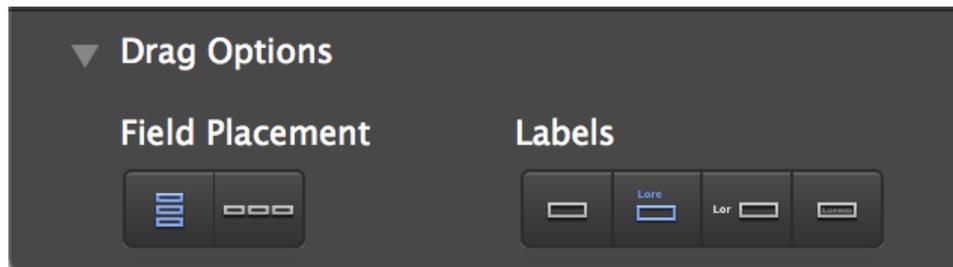


FIGURE 48

5. With less screen space on iPhone, you may not want to include all the fields from the iPad layout. Add the following fields to the layout with the **Field Picker**:
 - Item
 - Serial Number
 - Signature
6. If necessary, extend the layout's height by dragging down the bottom edge of the **Body**. In **Browse** mode, your layout should look like Figure 49.

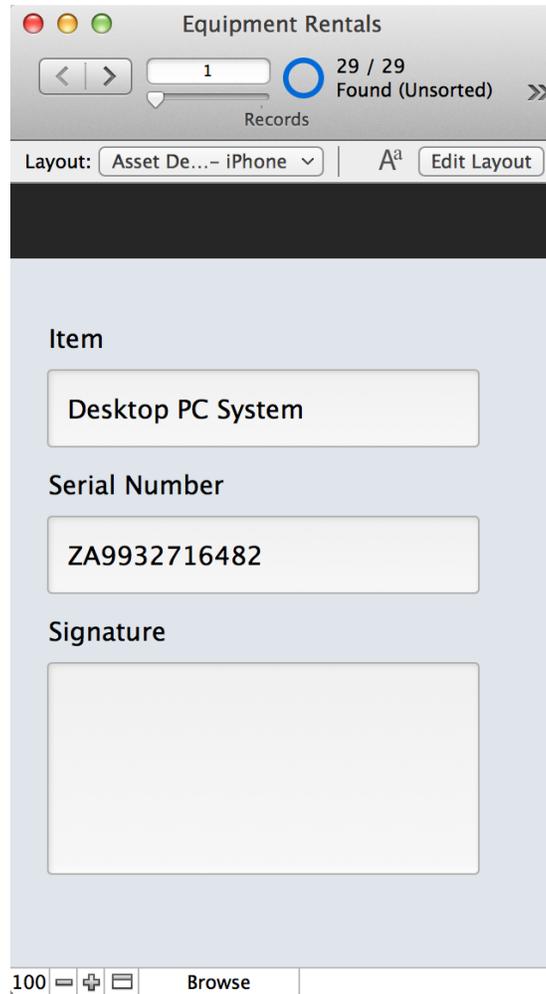


FIGURE 49

Creating iOS Layouts

When creating a new layout for an iOS device, FileMaker Pro will create a script that is attached to the layout as a script trigger. This means that automation has been added to the layout based on user interaction with it. The script locks the zoom feature on the device, which prevents the layout from zooming in if a user accidentally double-taps on it.

Lesson 10: Review Questions

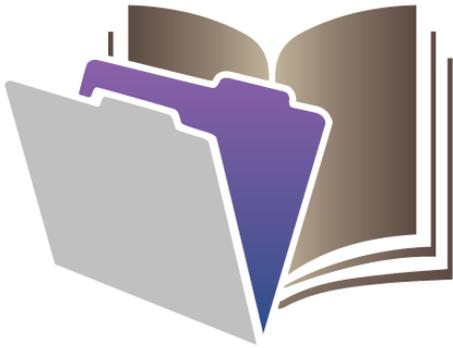
1. What is the name of the object control center where you can view and modify the settings for any object?
2. What do Screen Stencils show?
3. What is the difference between Dynamic Guides and Ruler Guides?

Lesson 10: Review Answers

1. The **Inspector** is the object control center where you can view and modify the settings for any object.
2. Screen stencils show the borders of a chosen device for the size specified.
3. Dynamic guides automatically display blue lines that help you align and size objects in relation to other objects on the layout. When designing a layout, you have control in setting ruler guides where you need them to align objects consistently on one or many layouts.

Lesson 11

Special Layout Objects



Lesson 11: Special Layout Objects

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to create the following layout objects:

- Portal
- Tab Control
- Panel Control
- Popover
- Web Viewer

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From the **Status Toolbar**, you can add basic items such as text, shapes, fields, and a variety of special layout objects, as shown in Figure 50. These objects perform specific and special functions on a layout that you will learn about in this lesson.

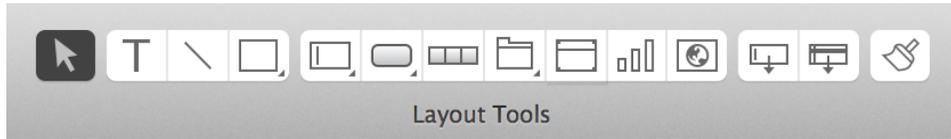


FIGURE 50

LESSON 11

Section 1: Portal

A portal is a tool for displaying a set of related records. In a one-to-many relationship, a portal shows the "many" side of a relationship.

In Activity 8.2, you created a relationship from Assets to Customers, where the Asset's **Customer ID** field matches the Customer's **Customer ID** field.

Activity 11.1: Viewing Related Data via a Portal

You will create a portal on the **Customer Details** layout that will show related Assets.

1. Navigate to the **Customer Details** layout and enter **Layout** mode. Turn off any screen stencils used in previous activities.
2. Portals are created by either clicking on the **Portal** tool  in the Status Toolbar or using the **Insert > Portal** menu item. For this step, choose **Insert > Portal**.
3. In the **Portal Setup** window, click on the **Show related records from:** drop-down and choose **Assets** as the related table (Figure 51).

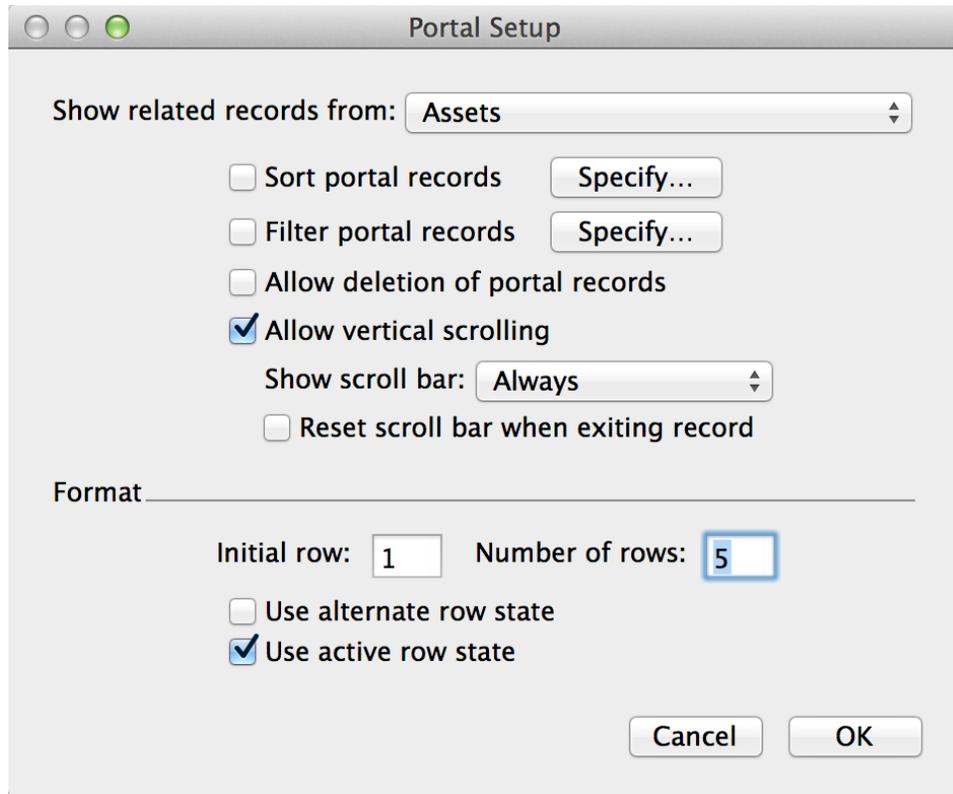


FIGURE 51

4. Activate **Allow vertical scrolling** to enable the user to scroll down if the list of related data extends beyond the viewable area. Click **OK**.
5. A window titled **Add Fields to Portal** will appear. Double-click on the following fields and click **OK**:
 - Category
 - Item
 - Serial Number
 - Purchase Date
 - Cost

6. A portal with related fields in its first row will appear on your layout. Move the portal to the right side of the screen.
7. Adjust the width of the portal and the related fields by making them bigger.
8. Unlike adding fields using the **Field Picker**, the **Portal** tool does not automatically create related field labels. Use the **Text** icon in the toolbar to manually add labels for each field.
9. Go to **Browse** mode and your portal on the layout should look similar to Figure 52.



Category	Item	Serial Number	Purchase Date	Cost
Telephones	VOIP Telephone	779182737S	1/12/2012	75
Computers	15" Notebook	BN299765G	10/22/2012	1000

FIGURE 52

Adding Related Fields to a Layout

Earlier you created a relationship from Assets to Customers, where the Asset's **Customer ID** field (a foreign key) matches the Customer's **Customer ID** field (a primary key). In order to show data from a related record, you can change the **Current Table** drop-down in the **Field Picker** to the correct related table and add fields to the layout.

Activity 11.2: Adding Related Fields

You will add the **Company** field to the **Asset Details - iPad** layout from the related Customers table.

1. Navigate to the **Asset Details - iPad** layout.
2. Enter **Layout** mode.
3. Using the **Field Picker**, change the **Current Table** drop-down in the **Field Picker** to the related table **Customers**, and change the **Drag Options** to not include a label.
4. Drag the **Company** field onto the layout next to **Customer ID** so it looks like Figure 53.
5. Enter **Browse** mode and navigate between records to view the company name for each asset.

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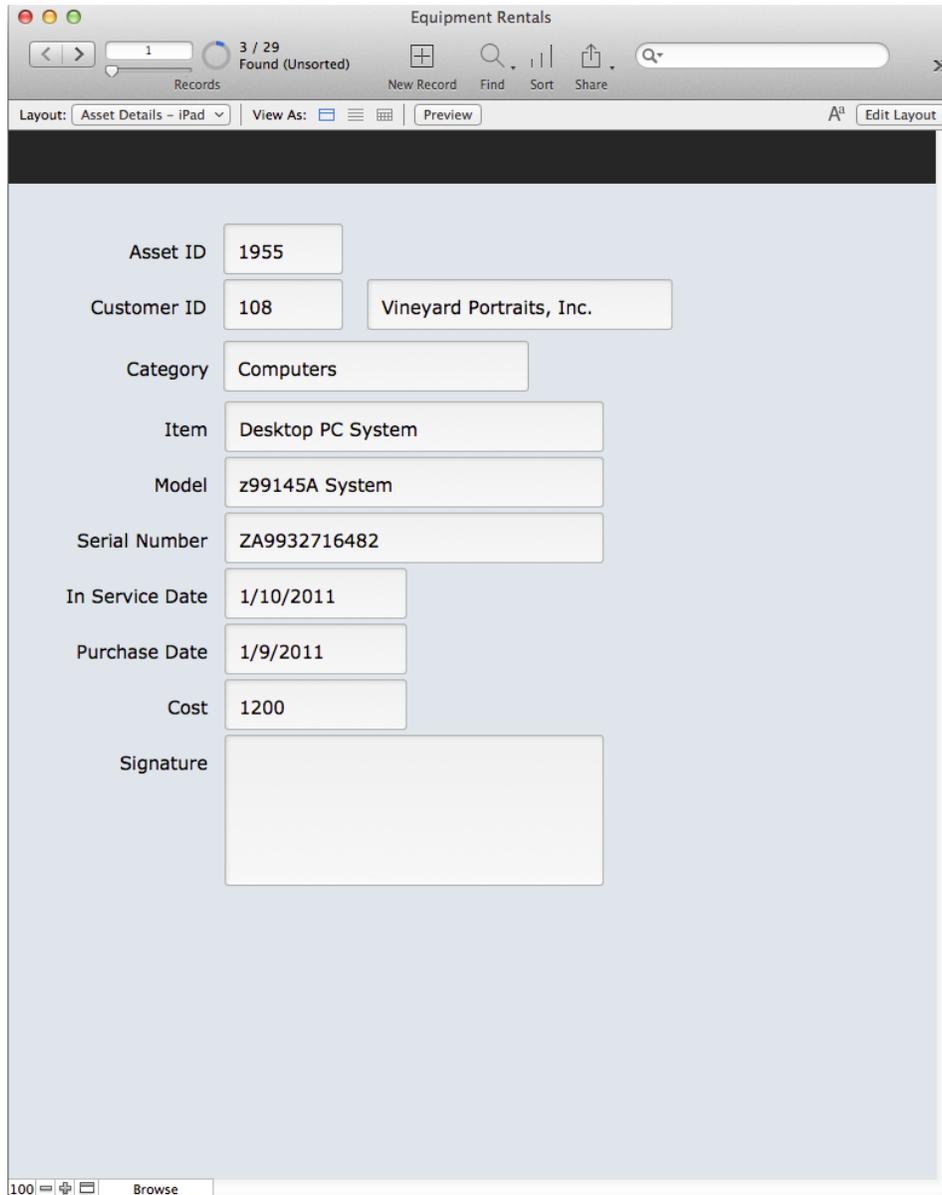


FIGURE 53

LESSON 11

Section 2: Tab Control

A user interface that includes tabs is a popular design feature for many applications. When you select a tab, it displays a unique set of objects or data, which allows you to use the same section of layout real estate for multiple purposes.

The term *tab control* refers to the entire layout object, as shown in Figure 54. Each tab control contains one or more individual tab panels identified by a series of tabs running across the top of the object. Note that the tab control is not a navigation tool; rather, it is a layout organization tool used to selectively display different sets of fields (or related fields) from the same layout context.

Item	Cost
VOIP Telephone	\$75
15" Notebook	\$1000

\$1075

FIGURE 54

Tab controls are placed on the layout using the **Tab Control** tool  in the **Status Toolbar**. You can modify the appearance of a tab control object in several ways. You can add, rename, remove, or reorder the panels in a tab control through the **Tab Control Setup** dialog (shown in Figure 55). Access the **Tab Control Setup** dialog by **double-clicking** or **right-clicking** the tab object. The **Tab Control Setup** dialog also provides a way to define the default front tab, the tab justification, and tab width.

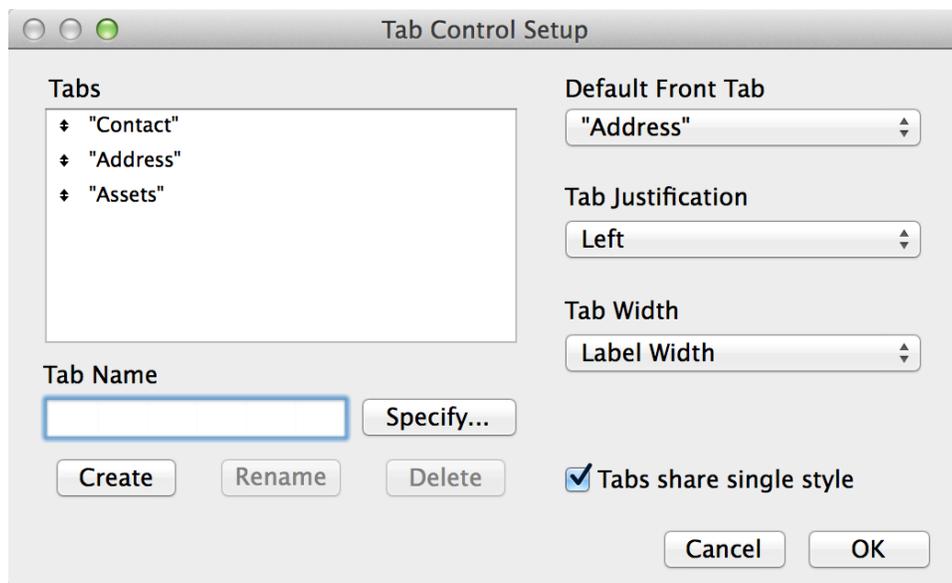


FIGURE 55

With the help of the **Inspector**, you can customize many other aspects of your tab control. Using the **Appearance** tab of the **Inspector**, you can specify the background fill, borders, and corner radius, as well as tab-specific attributes for the hover state. However, all tabs must have the same text style attributes, such as font, color, and size.

To place an object on a tab panel:

1. Enter **Layout** mode.

2. Select the tab panel.
3. Move the object so that it is entirely contained within the boundaries of the selected tab control.

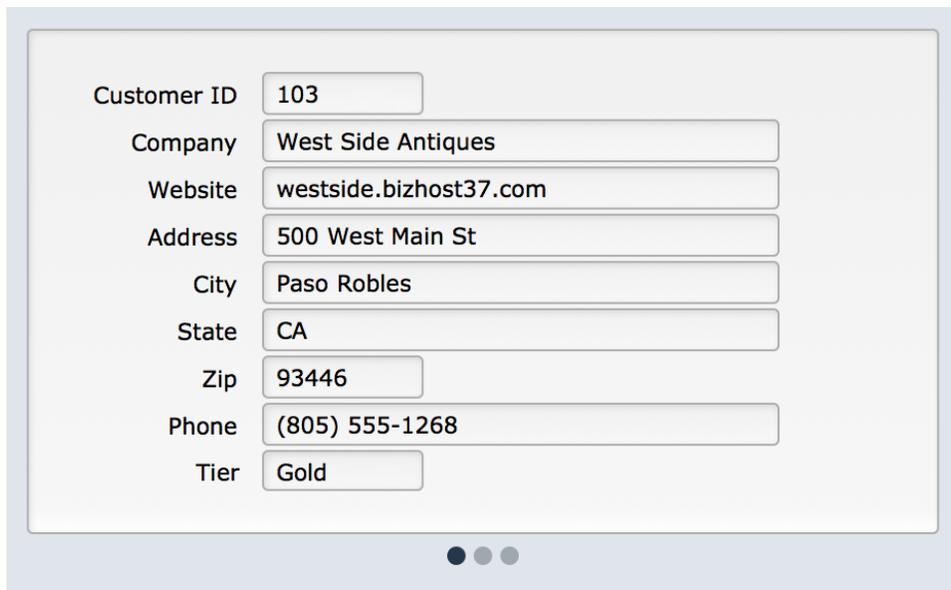
If you need to move a tab control, simply drag the tab control object itself. All objects contained within all tabs will move.

LESSON 11

Section 3: Slide Control

The slide control is inspired by the page control of the iOS interface. The springboard (or home screen) on iPad, iPhone, and iPod touch is an example of an iOS page control.

Similar to the tab control, the term slide control refers to the entire layout object as shown in Figure 56.



The image shows a slide control layout object with a light blue border. Inside, there is a form with the following fields and values:

Customer ID	103
Company	West Side Antiques
Website	westside.bizhost37.com
Address	500 West Main St
City	Paso Robles
State	CA
Zip	93446
Phone	(805) 555-1268
Tier	Gold

At the bottom center of the slide control, there are three small circles: the first is dark blue, and the other two are light gray.

FIGURE 56

Each slide control can contain one or more slide panels. Because the two controls are related, the tab control and slide control are created using a single tool on the status toolbar.

To add a slide control to a layout:

1. Click and hold the **Tab Control**  or **Slide Control**  tool and select **Slide Control**.
2. Click and drag on the layout to draw the boundaries of the new slide control.

After drawing the boundaries of the slide control, the **Slide Control Setup** dialog, shown in Figure 57, will appear. It can also be opened by double clicking the slide control object. The **Slide Control Setup** dialog includes settings for:

- Specifying the number of panels
- Whether or not FileMaker Go or touch-enabled FileMaker Pro users can swipe to navigate between panels
- Whether or not navigation dots are displayed
- Specifying the size of the navigation dots

Note that when the dots are not displayed, the developer must provide buttons or some other scripted way to navigate between slide panels.

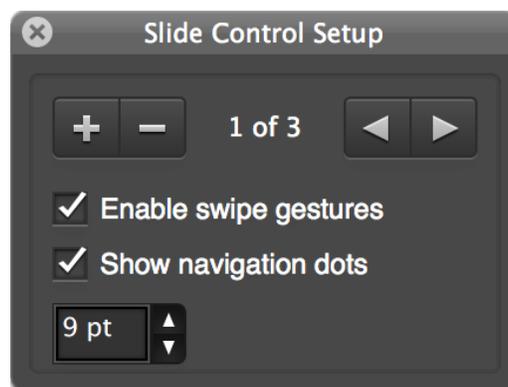


FIGURE 57

LESSON 11

Section 4: Popover

When you click a popover button, it expands to display a popover object that floats over the window, obscuring the content behind it. Figure 58 shows a popover button that has been clicked to reveal the popover object. The popover object is a panel in which you can display any type of layout object. Similar to a tab control or slide control, it has the same context as the layout.

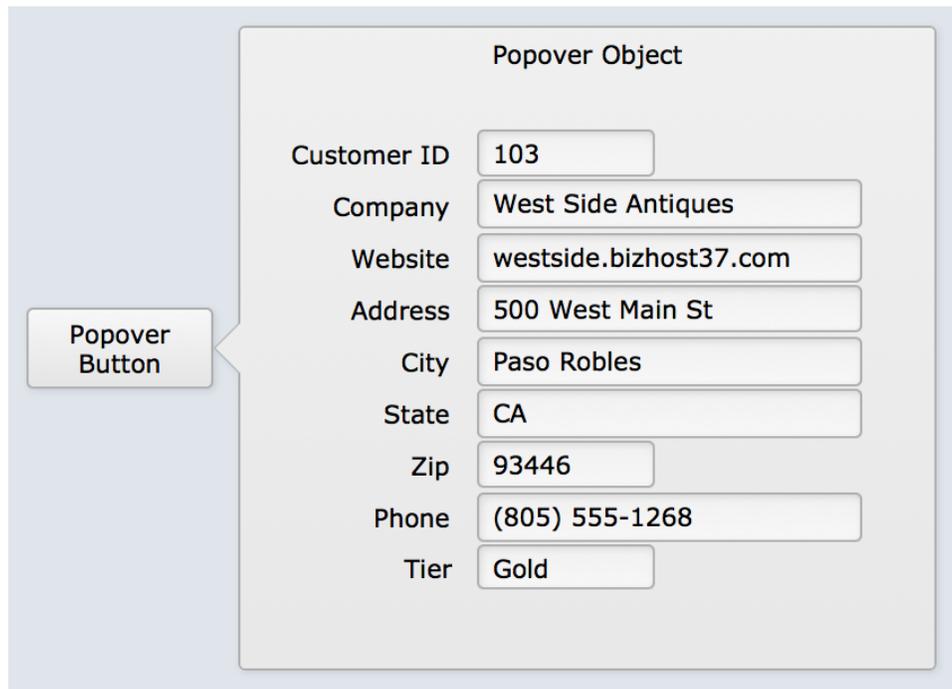


FIGURE 58

Like the tab control and slide control, popovers can be used to hide portions of a complex layout, only revealing the information when it is needed. They also simplify the user experience by providing an alternative to switching to another layout or opening a new window. Here are some of the ways you could use them:

- Detailed information about an object or data
- A portal containing a related set of data
- A web viewer used to render a map, dashboard, or aggregate information
- Help text to give the user instructions
- A navigation bar or navigation sub-menu

Similar to tab controls and slide controls, a single tool on the Status Toolbar is used for creating buttons and popover buttons.

To add a popover button to a layout:

1. Click and hold the **Button**  or **Popover Button**  tool and select **Popover Button**.
2. Click and drag on the layout to draw the boundaries of the popover button.

When a popover button is created, its associated popover object is automatically created, and the **Popover Button Setup** dialog (Figure 59) is displayed. This dialog provides options for specifying the popover button's text and icon placement, the text to display on the button, the popover object's title, the location of the popover object relative to the button, and script triggers.

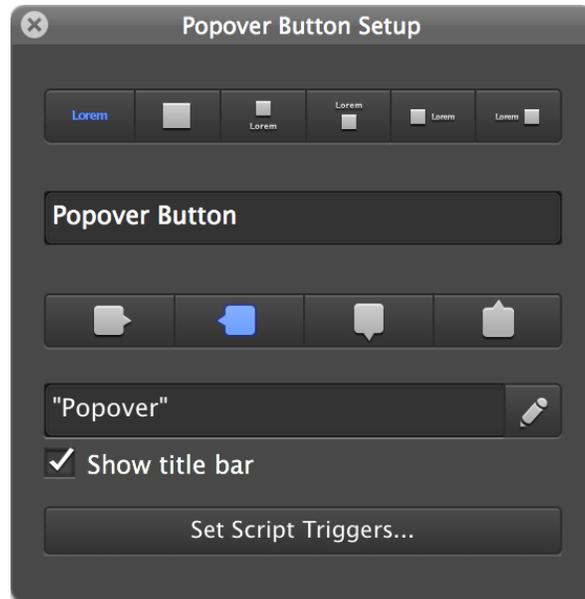


FIGURE 59

Once the **Popover Button Setup** dialog is closed, it can be displayed again by **double-clicking** the popover object or by **right-clicking** the popover object and selecting **Popover Button Setup**.

LESSON 11

Section 5: Web Viewer

A web viewer is an object used to display web pages directly in a FileMaker layout. Web viewers have many practical uses in FileMaker solutions. For example, a web viewer can:

- Display a map website that contains directions to the address stored in a company record
- Calculate the URL for tracking a package based on data stored in a tracking number field
- Display search engine results for data from a product name field
- Look up stock quotes for company records
- Display reports and graphs using financial data from your FileMaker solution

The **Web Viewer Setup** dialog allows you to construct the URL that the web viewer uses to display a web page. The URL usually includes fields in the calculation, meaning that data from the current record can be used to dynamically search the web.

Note: The user's device or computer must be connected to the Internet in order for a web viewer to display an external web page.

Activity 11.3: Adding a Web Viewer

In this example, you will add a web viewer to the **Customer Details** layout and configure it to display Google Maps search results for the customer's address.

Please note that you will need to be connected to the internet in order for the web viewer in this example to connect to Google Maps.

1. Go to the **Customer Details** layout and go into **Layout** mode.
2. Select the **Web Viewer tool** ( icon) in the **Status Toolbar**. Define the area on the layout by drawing a box for the boundaries of the new web viewer. The **Web Viewer Setup** dialog will appear.
3. Choose **Google Maps (US)** in the **Choose a Website** box on the left hand side.
4. Click on the  button next to the Address box and select **Specify Field Name...**
5. Choose the **Address** field from the **Customers** table and click **OK**.
6. Repeat steps 4 and 5 for the City, State, and Zip Code boxes, selecting the **City**, **State**, and **Zip** fields from the **Customers** table accordingly. The **Web Viewer Setup** dialog should look like Figure 60 when you are done.

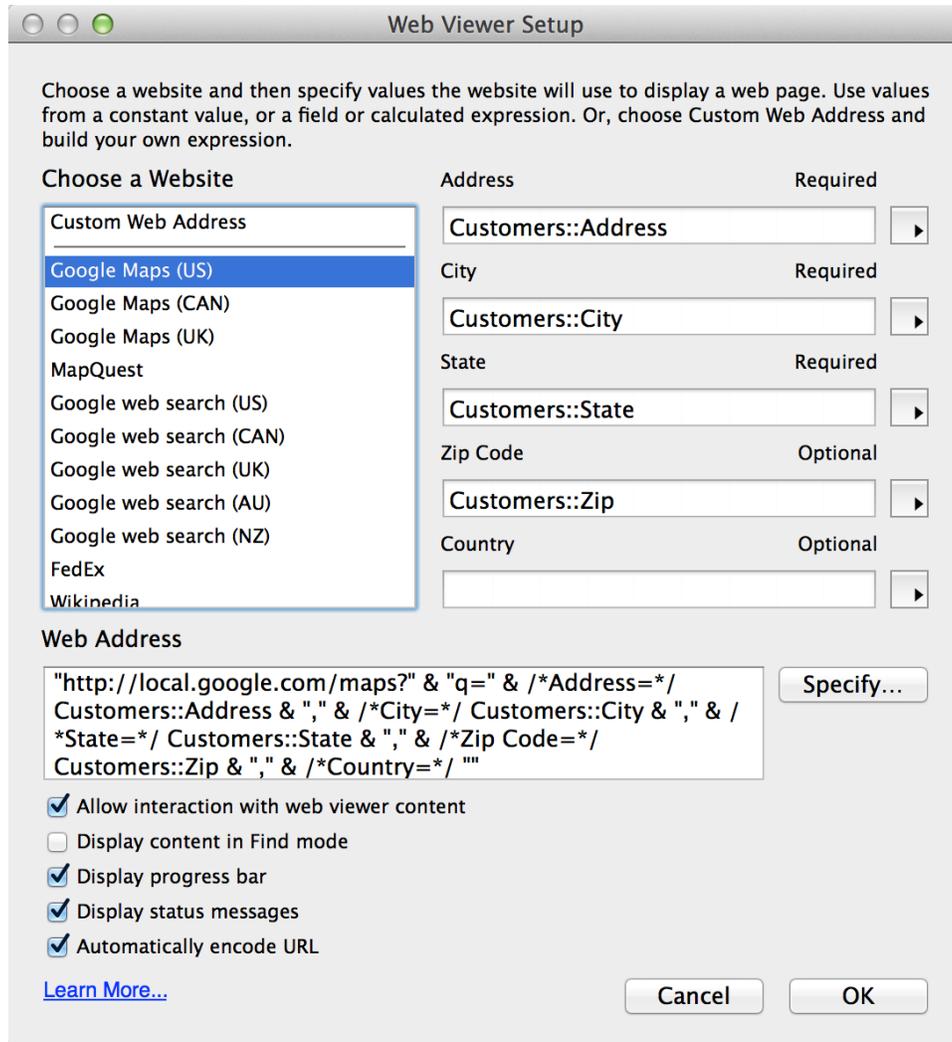
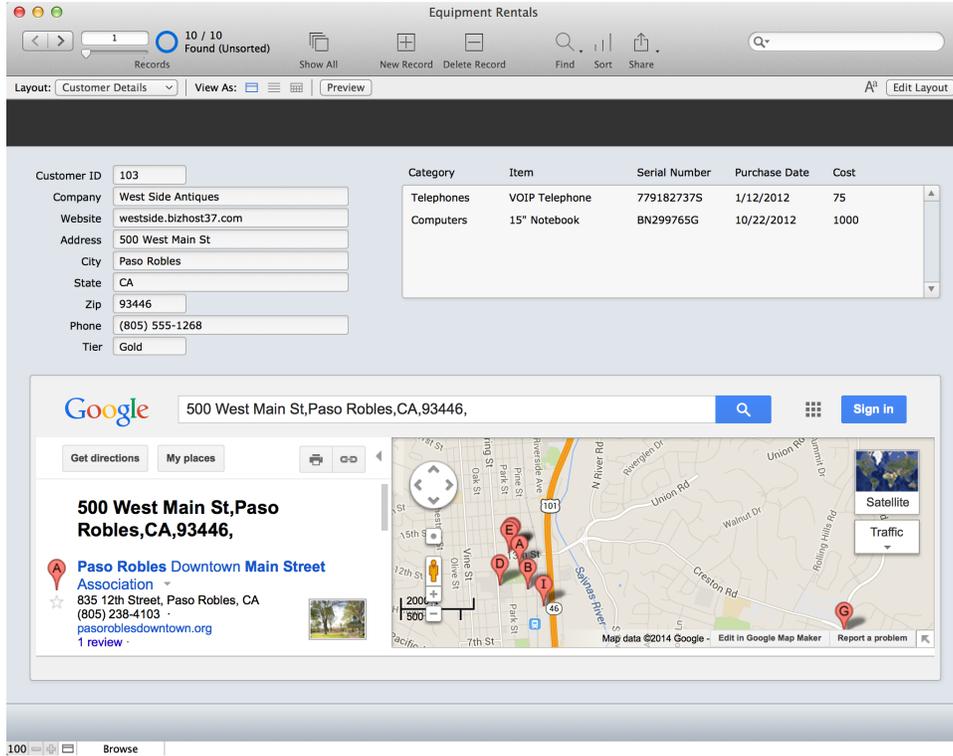


FIGURE 60

7. Click **OK** on the **Web Viewer Setup** dialog, save the layout, and go into **Browse** mode. Your layout should look similar to Figure 61.

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FIGURE 61

Navigate through Customer records to test the web viewer. It should display Google Maps search results for the address of the current Customer record.

Note: You may need to make the web viewer larger (and possibly the layout as well) in order to view the contents of the Google Maps page.

Lesson 11: Review Questions

1. What are five special layout objects?
2. A portal is used to view which side of a one-to-many relationship?
3. How do you add an object to a tab control?
4. What are some uses for popover buttons?
5. How can web viewers be dynamic?

Lesson 11: Review Answers

1. Portals, tab controls, slide panels, popovers, and web viewers are five special layout objects.
2. Portals are used to view the “many” side of a relationship.
3. To add an object to a tab control, select the tab panel you would like the object to reside on, then drag the object onto the panel until it is completely surrounded by the tab control.
4. Popovers can be used for situations where you might have needed another window to display things like detailed information about other data, a map, help text, or a navigation bar.
5. Web viewers can go to websites based on field data, allowing them to dynamically search the web.

Lesson 12

Formatting Field Objects



Lesson 12: Formatting Field Objects

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Format a date, number, or time field object.
- Apply conditional formatting to a field.
- Change the control styles for a field.
- Create a static value list.

Users spend much of their time viewing and editing data in a solution. FileMaker's many options for formatting data allow you to create a more

consistent user experience. You can also help speed up the data entry process by providing users with pop-up menus, drop-down calendars, and more.

In this lesson, you will learn about the different ways to format dates, times, and numbers, the options for formatting objects based on certain conditions, and controls for data entry.

LESSON 12

Section 1: Data Formatting

In addition to specifying attributes of your data including font and color, FileMaker Pro allows you to display numbers and dates with special formatting—such as currency, a percent, a specific date format, and so on. The **Inspector** helps you apply these types of formatting at the object level.

By default, the formatting for a date field will be **As Entered**. If a user types 6/7/2015 or 6.7.2015, the user would see the values exactly as the user entered it. On a list view layout, inconsistency in formatting can make it harder to scan and interpret the data quickly.

With Data Formatting, you have the flexibility to format that data in numerous ways for consistency while allowing users to enter data in any format they wish.

Activity 12.1: Applying Formatting to Fields

You will change the formatting on the date fields so they will show consistently, regardless of how the user entered the data.

1. Navigate to the **Asset Details - iPad** layout
2. Enter **Layout** mode and open the **Inspector**.
3. Select the **In Service Date** and **Purchase Date** fields by holding down the **Shift** key and clicking on both fields.
4. In the **Inspector**, choose the **Data** tab. The last section is titled **Data Formatting**.
5. Click on the **Format** drop-down to see all the date formatting options.

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6. Choose the format that shows the date in **MM/DD/YY (12/25/14)** format. In the example above, regardless of how the user enters the date, it will now display on this layout as 6/7/15.
7. Change the data formatting for the **Cost** field by choosing **Currency** and setting the **Fixed number of decimals:** to **2**.
8. Increase the width of the **Cost** field so that you will be able to see the result (Figure 62). Return to **Browse** mode.

The screenshot shows the FileMaker 14 interface for the 'Equipment Rentals' database. The layout is 'Asset Details - iPad' and is in 'Browse' mode. The form contains the following fields and values:

Asset ID	1955	
Customer ID	108	Vineyard Portraits, Inc.
Category	Computers	
Item	Desktop PC System	
Model	z99145A System	
Serial Number	ZA9932716482	
In Service Date		
Purchase Date	1/9/11	
Cost	\$1200.00	
Signature		

FIGURE 62

Formatting fields is a common practice in order to keep your data looking consistent. Often, numbers are shown as currency for a price field and as a percentage for a margin field. Time fields can be set to 12 or 24 hour formatting. For Container fields, you can specify whether the original proportions will be maintained, as well as if the user will be able to interact with certain file types like PDFs and videos.

LESSON 12

Section 2: Conditional Formatting

Conditional formatting allows you to change the look of an object based on specified rules. By doing so, you can draw a user's attention to data that might be missing, incorrect, or outside of certain boundaries. For example, you can specify that a field have a red background color when it is empty and white when the field contains a value. A price field might display bold and red if its value is greater than \$5,000.

Activity 12.2: Using Conditional Formatting

You will apply conditional formatting to the **Cost** field. If the cost is more than \$1,000, the cost will appear in blue.

1. On the **Asset Details - iPad** layout, in **Layout** mode, select the **Cost** field.
2. Choose **Format > Conditional...** A window will appear, allowing you to set the criteria that will activate the conditional formatting.
3. Click **Add**.
4. In the **Condition** section, change **between** to **greater than**, then type "**1000**".
5. In the **Format** section, activate **Text Color** and choose a bright blue, as shown in Figure 63 and click **OK**.

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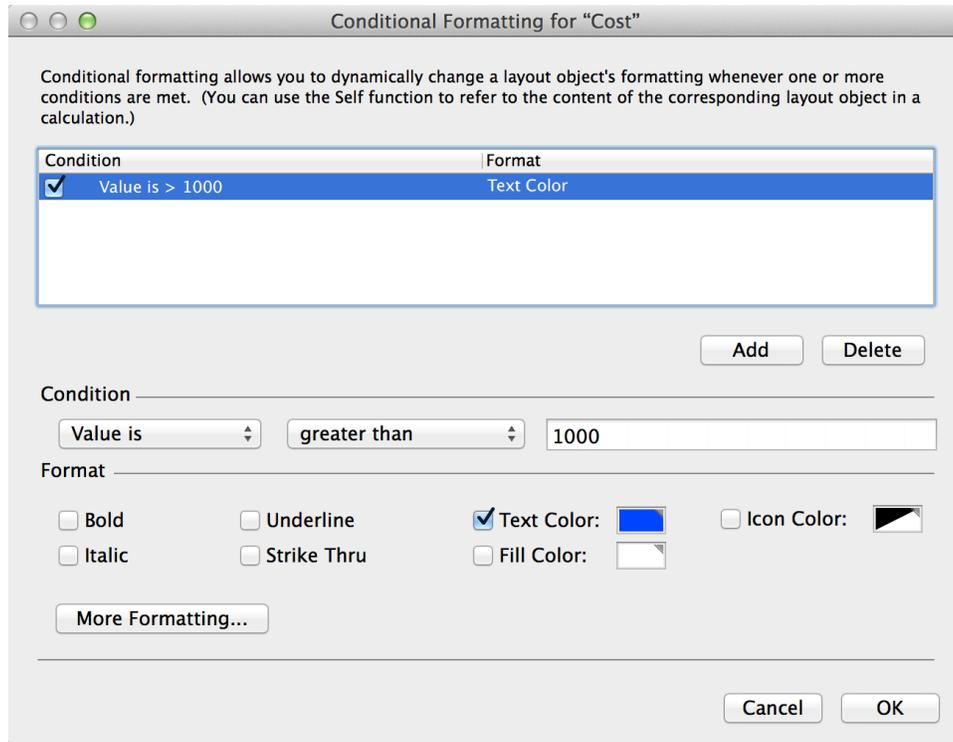


FIGURE 63

6. Enter **Browse** mode and look at different records. Notice that any value over 1000 (but not equal to 1000) shows as blue text.

LESSON 12

Section 3: Field Control Styles

Whenever people manually type in data, misspelling and inconsistencies occur. Field control styles are used to format how users interact with fields. The two primary benefits of field control styles are:

- Users can enter data faster.
- Your data will be more accurate and consistent.

To set the control style for a specific field, open the **Inspector** and use the **Field** section of the **Data** tab.

There are six different control styles. They are:

- **Edit Box:** This is a standard field for free-form data entry. An Edit Box can include a vertical scroll bar and offers the option to auto-complete data from previously entered values.
- **Drop-down List:** You can use this style to enable users to choose an item from a value list or to manually enter a value. Use this option when there are a large number of values to choose from.
- **Pop-up Menu:** To use this style, you must click on the menu to activate it, then see your available choices. This style is good when there are only a few items in the list because the pop-up menu grows to show all the possible choices.
- **Checkbox Set:** This style presents the value list as a set of checkboxes which users can select and deselect. More than one checkbox can be selected.

- **Radio Button Set:** Radio buttons are similar to checkboxes except that clicking one radio button causes a different radio button to be deselected, so that only one value is selected at a time. This style is appropriate for lists with exclusive choices such as yes or no.
- **Drop-down Calendar:** This control style allows users to select a small drop-down calendar to enter a date into a field.

LESSON 12

Section 4: Value Lists

Value lists in FileMaker Pro help facilitate rapid data entry and minimize the possibility of data errors, misspellings, or inconsistency. Instead of requiring a user to type something like a project status, you can set up a value list so the user can choose Active, Inactive, or Pending from a drop-down list or a radio button set.

A value list can be made of static values, like the project status example above, or it can be a dynamic list, which means that the values are based on a field in your FileMaker solution. This type of dynamic list is used frequently for selecting the value for a foreign key field.

In the Equipment Rentals file, the Category field in the Assets table is a great candidate for a drop-down list, which will help standardize the values entered into the field. The Equipment Rental discovery phase identified issues with incorrect and misspelled values in the data. By setting the field with a drop-down list, there is less chance for error in data entry.

Activity 12.3: Using Field Controls and Value Lists

1. On the **Asset Details - iPad** layout, enter **Layout** mode.
2. Add the **Category** field to the layout, below **Customer ID** and above **Item**.
3. Click on the **Category** field. In the **Inspector**, choose the **Data** tab. In the **Field** section, click on the **Control Style** list and choose **Drop-down** list.

4. Click on the pencil icon next to **Values from:**. This will bring up the **Manage Value List** dialog. Click **New**.
5. Name the value list **Categories**.
6. Type the following into the custom values, as shown in Figure 64:

Appliances

Cameras

Computers

Office Furniture

Telephones

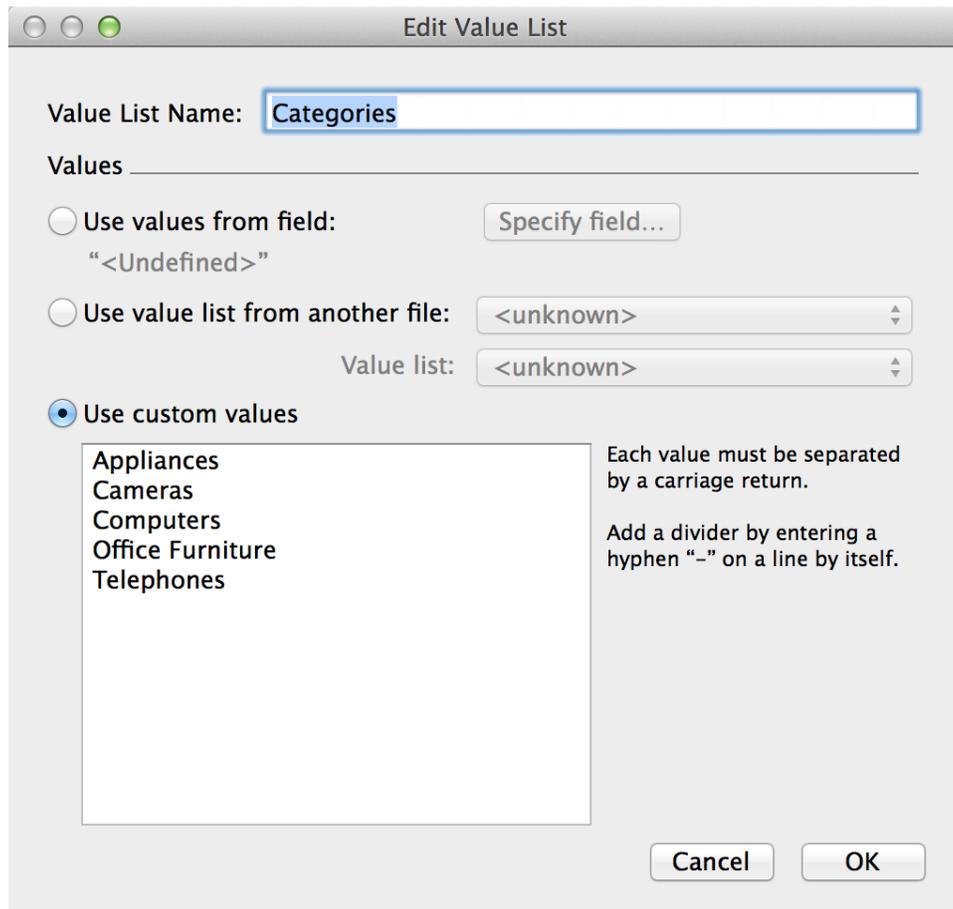


FIGURE 64

7. Click **OK** to close the **Edit Value List** dialog. Click **OK** again to close the **Manage Value Lists** dialog.
8. Switch to **Browse** mode and click in the **Category** field. From now on, when a user clicks in the **Category** field, the list of values will appear.

Similar to conditional formatting, field control styles are applied per object. If you want to add a drop-down list to any instance of the Asset's **Category** field on a layout, you will need to edit each instance.

Lesson 12: Review Questions

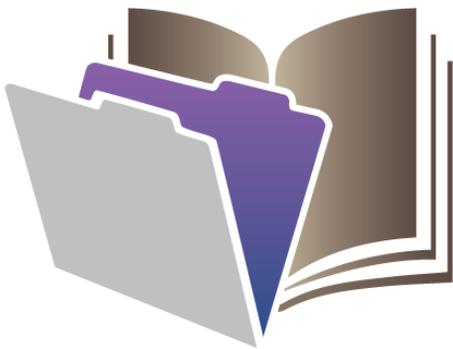
1. What is the main goal of data formatting?
2. How can conditional formatting help users?
3. How can field control styles improve data consistency?
4. What are the two types of value lists?

Lesson 12: Review Answers

1. The goal of data formatting is to make data look consistent and not dependent on user entry.
2. Conditional formatting changes the appearance of layout objects based on logical conditions. Generally, it is used to draw users' attention to important data.
3. Field control styles improves data consistency by allowing users to select from a set of values instead of typing free form.
4. The two types of value lists are static (using custom values) and dynamic (using values from a field).

Lesson 13

User Interface Best Practices



Lesson 13: User Interface Best Practices

Lesson Overview

Time

This lesson takes approximately 5 minutes to complete.

Objectives

After this lesson, you will be able to create layouts that:

- Have a purpose.
- Are optimized for touch devices.
- Offer a pleasing, consistent experience.

The last four lessons demonstrated many of the tools for building interfaces in FileMaker. With all of the options at your disposal, it is helpful to have some guidelines for building the best possible solution for your users.

This lesson will provide you with a list of best practices for building interfaces in FileMaker, including guidelines for the support of multiple devices, the usage of color and styles, and the need for a consistent and predictable interface.

LESSON 13

Section 1: User Interface Best Practices

Here are some guidelines for you to follow when building your solutions.

- **Build layouts for each device type** - For the best user experience, you will want to design specific layouts for each device. For example, use one layout for iPhone, a different one for iPad, and yet another for a laptop or a large desktop display. Building separate layouts for each device ensures that your solution delivers the best possible experience based on each device's unique properties.
- **Purpose** - The purpose of each screen should be clear and easy to understand. Users should be able to figure it out quickly and take appropriate action.
- **Hierarchy** - Each screen should have a clear, well-defined hierarchy of information. This helps users zero in on the information they need the most.
- **Touch** - When building for iOS devices, buttons should be a minimum of 44pt x 44pt to ensure they can be easily tapped with a finger.
- **Avoid typing when possible** - On a touch interface, typing is not always the optimal input method, and even on a standard computer keyboard, minimizing typing can be more efficient. Utilize intelligent default field values, value lists, and date pickers.
- **Color** - You can enhance the presentation of information through judicious use of color. However, be careful because too much color becomes

distracting and difficult for the user to process. Your user interface should not compete with the data it is presenting.

- **Proximity and Grouping** - Items that are close together should be logically related to one another. By grouping fields together, you can segment the workflow and help users find information easily.
- **Design Patterns** - Your solution may be unique, but you don't have to reinvent the wheel. Use common design patterns and the Apple Human Interface Guidelines to capitalize on models that users are already familiar with.
- **Grids** - Use grids as a framework for how information will be presented. Designing on a grid helps maintain grouping, spacing and consistency across different screens.
- **Whitespace** - Don't crowd your layout with too many objects. It is better to have several screens that are concise in their design and purpose than one large screen that crammed full of information that is hard to understand. Let your layouts breathe.
- **Consistency** - Use a consistent design model throughout your solution. First imagine all the different screens you might need to create, and then, as you build them, apply a consistent methodology. Once users become familiar with one area of your solution, understanding how information is presented and how objects behave, they will intuitively understand any other parts of the system that work in the same way.

Read the Human Interface Guidelines

The iOS Human Interface Guidelines describe the principles that help you design a superlative user interface for iOS apps. These principles are just as important for solutions you build with the FileMaker Platform as they are for apps built for the App Store.

Apple's iOS Human Interface Guidelines can be found here:

<https://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/>

Read the FileMaker WebDirect Guide

When creating browser-based solutions with FileMaker WebDirect, it is important to follow best practices for web design. The **FileMaker WebDirect Guide** will give you the information you need. This includes everything from using web-safe fonts and colors to achieving faster page load by including only those objects your users really need.

The **FileMaker WebDirect Guide** can be found here:

https://fmhelp.filemaker.com/docs/14/en/fm14_webdirect_guide.pdf

Lesson 13: Review Questions

1. How does having a clear hierarchy help a user interact with a solution?
2. What should be the minimum size of a button on a touch device?
3. What way of inputting data should be avoided in a touch solution whenever possible?
4. Why is consistency of the interface across a solution helpful?

Lesson 13: Review Answers

1. Having a clear hierarchy helps users zero in on the content they need.
2. Buttons should be at least 44pt x 44pt.
3. Typing with the onscreen keyboard should be avoided when possible.
4. Consistency of the interface across a solution helps users learn more quickly how it works. Once they understand one area of the solution, they can apply this knowledge when encountering other areas.

Lesson 14

Calculations



Lesson 14: Calculations

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Use the **Specify Calculation** dialog to define calculation fields.
- Use functions to manipulate data.
- Use operators to perform math and compare data.

Calculations are a key tool in setting up solution logic, which helps users complete tasks quickly and efficiently, and can be used to control data updates and other processes, resulting in better data integrity. You will use calculation functions for many tasks, such as displaying calculation field results, field auto-entry and validation, displaying tooltips, filtering portals, displaying conditional formatting, and various scripted operations. Because you will use calculation functions so often, mastering them is essential.

Here is what you learned about Calculations from the **Getting Started Tour**.

Creating Solutions > Calculations

- FileMaker Pro can perform simple and complex calculations on your data. For example, you can calculate a discounted price based on a list price and a discount percentage.
- Your calculations can include text, number, date, time, and container data.

LESSON 14

Section 1: Creating Calculations

Specify Calculation Dialog

All calculations in a FileMaker solution are defined using the **Specify Calculation** dialog. The **Specify Calculation** dialog allows you to work with fields, operators, and functions to create a formula. In certain cases, you can also control the result type and storage as well.

Figure 65 shows the **Specify Calculation** dialog for defining a calculation field. You can choose to double-click the fields, operators, and functions to insert them into the formula entry space; or, if you prefer, you can type them instead.

FileMaker Pro 14 added new features to the **Specify Calculation** dialog that make editing calculations quicker and easier. You can now search within the function and field lists using the **Quick Find** tool located above each list. Another new feature is calculation completion. As you type in the formula entry space, a list will appear containing fields, tables, and functions that match the text you entered. You can scroll through this list and select an item to add it to your formula.

When defining calculation fields, you must specify the result type at the bottom left of the **Specify Calculation** dialog. The result type dictates how the output will be interpreted by FileMaker Pro. Set the result type to that expected of the calculation. For example, the formula **Get(CurrentDate) + 14** would be expected to return a date 14 days from today. The formula **FirstName & " " & LastName** would be expected to return text that is the person's full name. The

formula **UnitPrice * Quantity** would be expected to return a number—the total cost for a group of items purchased together.

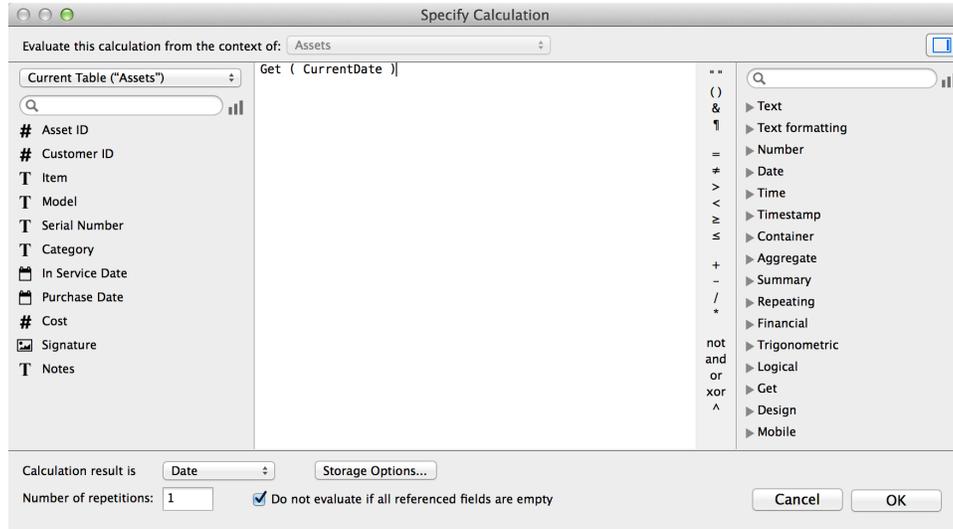


FIGURE 65

Creating Calculation Fields

One requirement for the Equipment Rentals solution is to provide two specific pieces of information: the number of days a Customer has leased an Asset and the total cost of a Customer's Assets. Calculation fields can produce both of these data points.

Activity 14.1: Creating a "Days Leased" Number Calculation Field

First you will define a field to calculate the number of days a Customer has leased an Asset. For this solution, the number of days leased is the difference between the current date and In Service Date.

1. Navigate to the **Fields** tab of the **Manage Database** dialog. Choose the **Assets** table in the **Table** drop-down, if it is not already selected.
2. Type **Num Days Leased** in the **Field Name** box.
3. Choose **Calculation** as the **Field Type**.
4. Click **Create**.
5. Type the formula `Get(CurrentDate) - In Service Date` in the formula entry space.
6. Choose **Number** for the result type in the lower left corner of the dialog.
7. Click **OK** to exit the **Specify Calculation** dialog and click **OK** again to exit the **Manage Database** dialog.
8. Add the **Num Days Leased** field to the **Asset Details - iPad** layout, shown in Figure 66, and check the results of the calculation by modifying the **In Service Date** field on a few records.

FileMaker Training Series: Basics for FileMaker 14

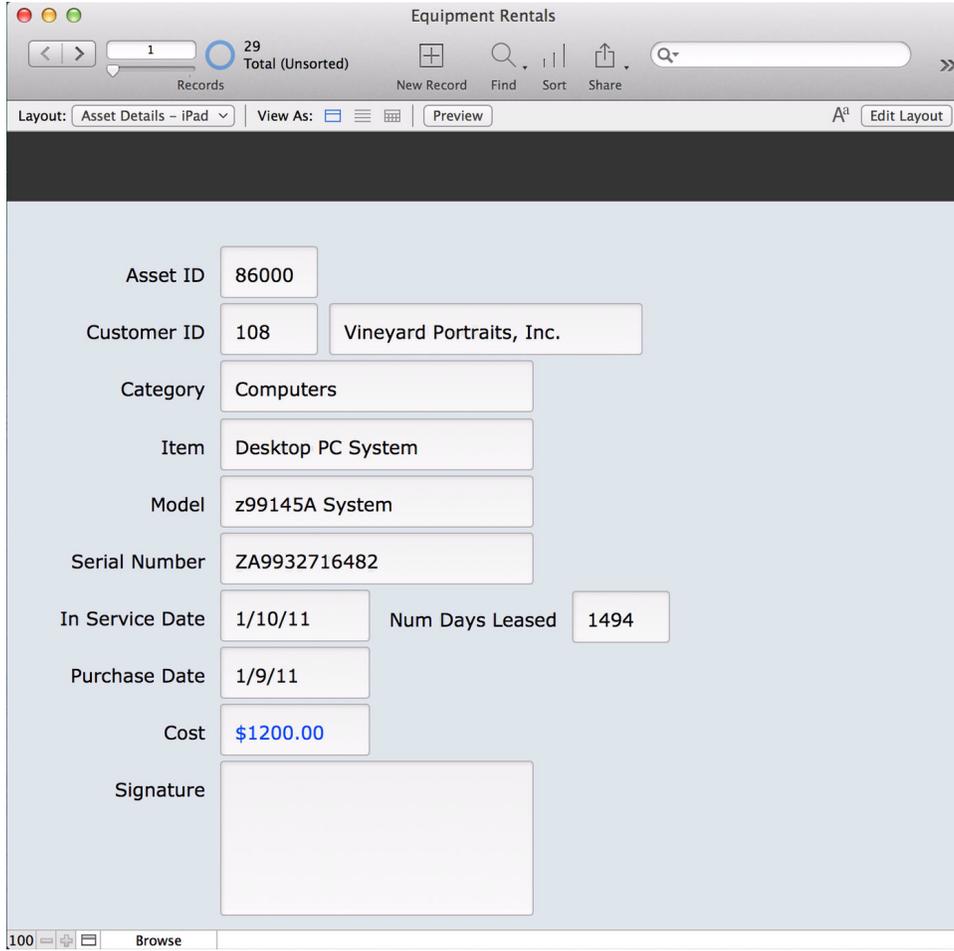


FIGURE 66

LESSON 14

Section 2: Functions and Operators

Functions

Functions are used in calculations to perform specific tasks and return a result. Often they accept data as one or more parameters, producing a result based on those parameters. For example, the **Length** function takes a single text parameter and returns the length of that text:

```
Length ( "Eugene" )
```

Result: 6

There are hundreds of calculation functions that have been grouped into various types based on their input parameters or result, including text, number, date, time, text formatting, financial, and aggregate functions. One special group, the “**Get**” functions, is noteworthy because many of its functions provide information regarding the user’s current session, such as the user’s account name, the current layout, the type of device being used, and the current date and time.

Activity 14.2: Creating a "Total Cost of Assets" Number Calculation Field

Next, you will create a calculation field to determine the total cost of a Customer's Assets, which is the sum of the **Cost** field across all of the Assets attached to a Customer.

1. Navigate to the **Fields** tab of the **Manage Database** dialog. Choose the **Customers** table in the **Table** drop-down.
2. Type "**Total Cost of Assets**" in the **Field Name** box.
3. Choose **Calculation** as the **Field Type**.
4. Click **Create**.
5. Type the formula `Sum(Assets::Cost)` in the formula entry space.
6. The **Calculation result** in the lower left corner of the dialog should be set to **Number**.
7. Click **OK** to exit the **Specify Calculation** dialog and click **OK** again to exit the **Manage Database** dialog.
8. Add the **Total Cost of Assets** field to the **Customer Details** layout as shown in Figure 67 and check the results of the calculation. The **Total Cost of Assets** field should equal the sum of the **Cost** field from each of the Customer's related Asset records.

Category	Item	Serial Number	Purchase Date	Cost
Telephones	VOIP Telephone	779182737S	1/12/2012	75
Computers	15" Notebook	BN299765G	10/22/2012	1000

Total Cost

FIGURE 67

Operators

In addition to the many functions available, you will often use operators to achieve the desired calculation result. FileMaker Pro provides the following operators for use in calculations:

- Standard math operators: add, subtract, multiply, and divide
- Text operators: carriage return (¶); ampersand (&) for appending one string to another; quotes for specifying literal text; and parentheses to manage the order of operations
- Logical operators: =, <, >, and, or, not, and so on

When using math operators in calculation formulas, the order of operations follows the rules of standard mathematics. Expressions within parentheses are evaluated first, then multiplication and division from left to right, then addition and subtraction from left to right. For example: **8 – 3 * (1 + 1)** returns **2**.

Text operators allow you to combine two or more text items into one larger item. For example, the formula **FirstName & " " & LastName** would return a person's

full name. Note that a space is needed within quotes to properly separate the contents of the **FirstName** and **LastName** fields.

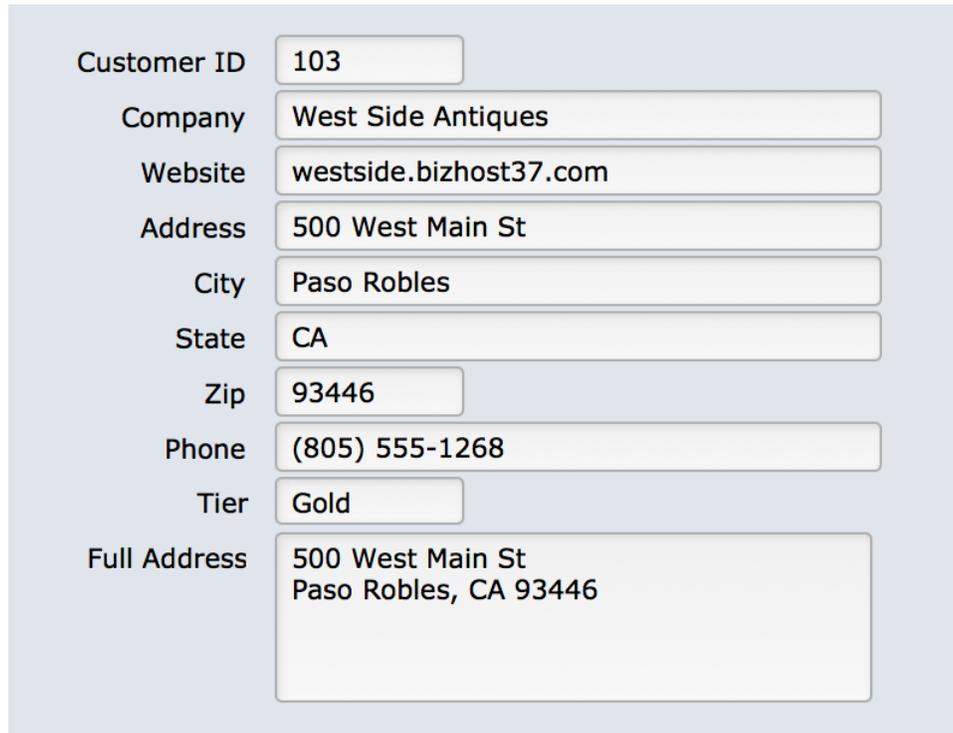
Logical operators are used to compare two expressions and return a true or false (1 or 0) result. This is known as a Boolean result. For example, **(grade > 80 and grade ≤ 89)** will return a value of **1**, or true, when the grade field contains a number greater than 80 but less than or equal to 89. Logical operators follow mathematical operators in the order of operations. Thus, $2 * 3 > 5$ evaluates as 1, while $2 * (3 > 5)$ evaluates as 0. They are evaluated in this order: comparisons such as the above, then AND, followed by OR.

Activity 14.3: Creating a Text Calculation Field

In this activity you will create a Full Address calculation field.

1. Navigate to the **Fields** tab of the **Manage Database** dialog. Choose the **Customers** table in the **Table** drop-down if it is not already selected.
2. Type "**Full Address**" in the **Field Name** box.
3. Choose **Calculation** as the Field Type.
4. Click **Create**.
5. Type the formula `Address & "¶" & City & ", " & State & " " & Zip` in the formula entry space.
6. The calculation result in the lower left corner of the dialog should be set to **Text**.
7. Click **OK** to exit the **Specify Calculation** dialog and click **OK** again to exit the **Manage Database** dialog.

8. Add the **Full Address** field to the **Customer Details** layout. The calculation result in the **Full Address** field should look similar to Figure 68.



The image shows a screenshot of a FileMaker layout with a light blue background. It contains several text input fields, each with a label to its left. The fields and their values are: Customer ID (103), Company (West Side Antiques), Website (westside.bizhost37.com), Address (500 West Main St), City (Paso Robles), State (CA), Zip (93446), Phone ((805) 555-1268), and Tier (Gold). Below these fields is a larger text area labeled 'Full Address' which contains the concatenated address: '500 West Main St', 'Paso Robles, CA 93446'.

Customer ID	103
Company	West Side Antiques
Website	westside.bizhost37.com
Address	500 West Main St
City	Paso Robles
State	CA
Zip	93446
Phone	(805) 555-1268
Tier	Gold
Full Address	500 West Main St Paso Robles, CA 93446

FIGURE 68

Boolean Results

Boolean results are an important concept to understand when writing calculations in a FileMaker solution as they are the building blocks of decision-making. When a calculation returns a true or false (1 or 0), this is a Boolean result. In FileMaker solutions, the word “True” or any non-zero calculation result is considered true. The word “False” or zero is considered false. Boolean results are used in features like Conditional Formatting, portal filtering, and Object

Visibility, each of which takes action when an expression specified by the developer returns a true result.

From the requirements for the Equipment Rentals file we can infer that the **Num Days Leased** field would not be applicable to an Asset when the **In Service Date** field is empty. Because of this, it would make sense to hide the **Num Days Leased** field until the **In Service Date** field contains a value.

Activity 14.4: Hiding an Object with an Object Visibility Calculation

In this activity you will use an Object Visibility calculation to hide the **Num Days Leased** field and its label when the **In Service Date** field is empty.

1. Navigate to the **Asset Details - iPad** layout and enter **Layout** mode.
2. Click and drag to select both the **Num Days Leased** field and its label.
3. In the **Inspector**, choose the **Data** tab. In the **Behavior** section, click on the pencil next to the box labeled **Hide object when**.
4. Type the formula `IsEmpty (Assets::In Service Date)` in the formula entry space. The **IsEmpty** function returns 1 when its parameter is empty.
5. Click **OK** to exit the **Specify Calculation** dialog and enter **Browse** mode. Try clearing the **In Service Date** field on a few records. The **Num Days Leased** field and its label should not appear when the **In Service Date** field is empty.

There are many other things you can do with calculations. For example, a calculated status field could compare an Invoice's due date with the current date and return either "Open" or "Overdue". Other common uses of calculations include calculating sales tax on an Order and creating display fields for a person's full name or for formatting a phone number.

Lesson 14: Review Questions

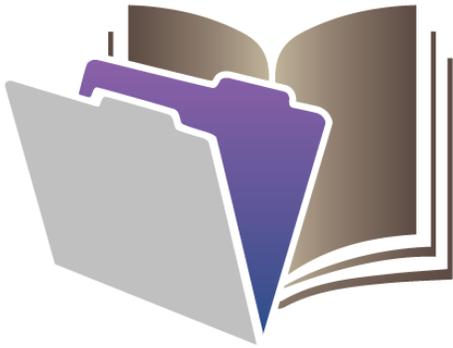
1. What are the three types of objects you can add to a calculation?
2. What do **Get** functions return?
3. What is a function?
4. What are the different types of operators?

Lesson 14: Review Answers

1. The three types of objects you can add to a calculation are fields, operators, and functions.
2. The **Get** functions return information about the user's current session.
3. A function is used in a calculation to perform a task and produce a result.
4. The three different types of operators are math, text, and logical.

Lesson 15

Scripting



Lesson 15: Scripting

Lesson Overview

Time

This lesson takes approximately 40 minutes to complete.

Objectives

After this lesson, you will be able to:

- Create, edit, and organize scripts.
- Attach scripts to buttons.
- Trigger scripts when opening a solution.

Scripting is another important aspect of solution logic. Scripting is a very powerful tool in FileMaker Pro that allows you to automate processes in your solution by specifying a series of actions that can be triggered in a variety of ways. Scripts can serve many purposes, from simple navigation tasks to complex reporting and workflow needs. Scripts can be called via buttons on layouts as well as via script triggers, which activate a script when a certain action happens, like entering a layout, navigating between records, or opening a file.

Here is what you learned about Scripting from the **Getting Started Tour**.

Creating Solutions > Scripts

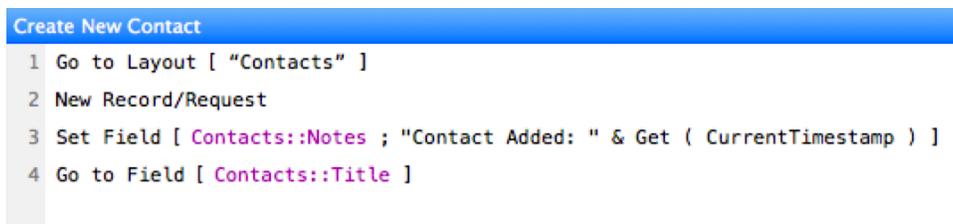
- With FileMaker Pro scripts, you can automate tasks like creating reports or emailing customers.
- A script is a set of instructions, called script steps.
- Simple scripts can perform a single task. Complex scripts can combine elements (such as user feedback) with programming techniques (such as branching and looping).

LESSON 15

Section 1: What Are Scripts?

A script is a sequence of instructions that accomplish a particular task. For example, Figure 69 shows a script that can create a new contact record by performing these tasks:

- Navigating to the **Contacts** layout
- Creating a new record
- Entering default data into the Notes field
- Placing the cursor in the Title field so the user can begin typing immediately



```
Create New Contact
1 Go to Layout [ "Contacts" ]
2 New Record/Request
3 Set Field [ Contacts::Notes ; "Contact Added: " & Get ( CurrentTimestamp ) ]
4 Go to Field [ Contacts::Title ]
```

FIGURE 69

It may be helpful to think of creating a script as writing a recipe for cooking. A recipe provides instructions (measuring, chopping, mixing, stirring, and simmering) in a particular order while working with a list of ingredients to produce a desired result. Some recipes (and scripts) are simple, while others are more complex and time-intensive.

Script Steps

A script is composed of script steps. Script steps are specific instructions that, when strung together in a script, can accomplish a larger task. The script steps are pre-defined commands that you select from a list. There are more than 150 script steps that perform actions such as navigating to a layout, creating and deleting records, and performing finds.

Most script steps are based on menu items. For example, frequently used menu items such as **New Record**, **Enter Find Mode**, and **Import Records** are all script steps. This makes scripting easy to learn for users who are familiar with using solutions in **Browse** and **Find** mode. Almost any sequence of actions that a user can do with menu items can be automated and run as a script.

LESSON 15

Section 2: Creating and Organizing Scripts

You can create, edit, and manage scripts using the **Script Workspace** in FileMaker Pro. If you have sufficient access privileges in the file, you can access the **Script Workspace** window using either of these methods:

- Choose **Script Workspace** from the **Scripts** menu.
- Use the keyboard shortcut **Command-Shift-S** in OS X or **Ctrl-Shift-S** in Windows.

An example of the **Script Workspace** window is shown in Figure 70.

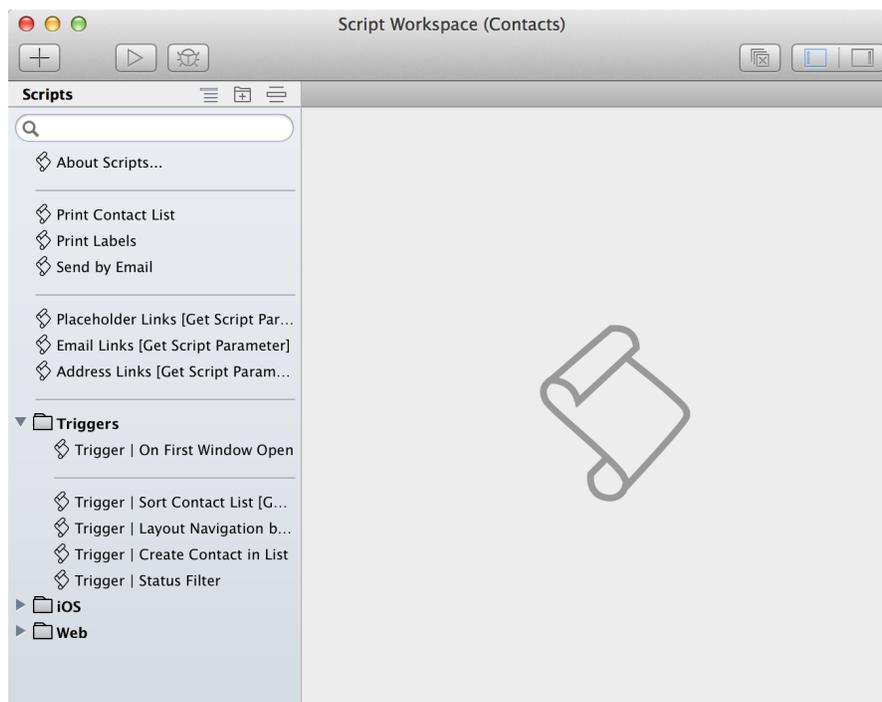


FIGURE 70

All of the scripts that have been created in a given database file are listed in the left panel of the **Script Workspace** window. In a new file that was not created from a Starter Solution, the **Script Workspace** window will be blank.

Organizing Scripts

Scripts can be organized into folders for easy grouping and retrieval. A FileMaker solution can easily contain dozens of scripts, often many more, so keep your scripts organized to save time and effort. You can create script folders by clicking the **Create new folder** icon (). You can move scripts by clicking the script name and dragging the script to a new location. To find scripts, the Quick Find box at the top of the script list allows you to filter the script list. As you type in characters, only those scripts with that character string in their name will appear.

The checkbox to the left of each script name indicates whether that script is listed in the **Scripts** menu. If you do not see a checkbox next to the script names, use the  icon in the Scripts header to toggle the display of the checkbox. Users can trigger these scripts directly from the menu. Typically, you will list only high-level control scripts in the menu, such as **Logout**, **Go to Menu**, **Login again**, and **Help**, but it's up to you to determine what makes sense for your solution.

You can delete scripts by using either of these methods:

- **Control-click** (OS X) or **right-click** (Windows) on the script and select **Delete**.
- Press the **Backspace** or **Delete** key after selecting one or more scripts.

Consequences of Deleting Scripts

Be careful when you delete scripts. The delete action cannot be undone and could break existing automation in your solution. Typically developers use the DDR (Database Design Report) generated by FileMaker Pro Advanced to check for any dependencies before deleting a script.

LESSON 15

Section 3: Editing Scripts

To create a script, click the **Create New Script** button () in the top left corner of the **Script Workspace**. A new script will appear in a tab on the **Script Workspace**, shown previously in Figure 70. By default, all new scripts are named "New Script". Script names need not be unique, but it is a best practice to make names that are unique and that describe the purpose of the script.

All of the individual script steps are listed on the right side of the **Script Workspace**. You can add a script step to your script using any of the following methods:

- Double-click the script step in the list on the right.
- Select the script step in the right panel, then press **Enter** or **Return**.
- Click in the script editing area and start typing the name of the script step to initiate script step auto-complete functionality. As you type the name of a script step a list will appear containing matching script steps. You can select a script step from this list to add it to your script.

FileMaker Pro does not limit the length of scripts or the number of steps that scripts can perform.

Not every script step is valid for every FileMaker environment. If you are writing a script intended for a FileMaker Go user, for example, limit your script to only those script steps that can be executed on iOS devices. The **Show**

Compatibility button () near the top right of the **Script Workspace** window allows you to select a target platform, such as iOS or FileMaker WebDirect. As a

result, those script steps that are incompatible with the selected platform will appear greyed out.

When a step in a script is selected, you can view and specify step options by clicking the gear icon () next to a script step. As you learn new script steps, you will learn about the options available for specific script steps. (Options for each script step are discussed fully in FileMaker Pro online help.)

You can save a script by choosing **Save Script** from the **Scripts** menu or by using the keyboard shortcut **Command-S** in OS X or **Ctrl-S** in Windows. You can always identify a script with unsaved changes because you will see an asterisk (*) at the beginning of the script name in the title of the script's tab panel. If you try to close the script's tab (or run the script) before you have saved it, FileMaker Pro will prompt you to save the script.

LESSON 15

Section 4: Triggering Scripts

After you have created a script, you must decide how and when it will be triggered. Scripts can be triggered in many different ways in FileMaker solutions, including:

- Any object on a layout can be defined to be a button and programmed to perform a script when a user clicks it. This option is described in detail in the next section, "Buttons."
- Scripts listed in the **Scripts** menu can be triggered manually by choosing the script item from the menu (or by using a keyboard shortcut, when available).
- Scripts can be defined to call other scripts, causing them to run. This interrupts the calling script until the called script is finished running, at which point the calling script resumes. The list of scripts that have called other scripts and are waiting to resume is named the "script stack".
- If you choose **File Options** from the **File** menu, you can define a script to trigger when any window opens, when the first window opens, when any window closes, and when the last window closes.
- You can define layout or object-level script triggers to run as users interact with your solution. Some examples of actions that can trigger a script are navigating to a layout, clicking or tabbing out of a field, or entering **Browse** or **Find** mode.

LESSON 15

Section 5: Buttons

You can use the **Button** tool to create a button object, or you can cause most of the other layout objects to behave just like a button and trigger a script. To access the **Button Setup** dialog for an object shown in Figure 71, use either of these methods:

- **Control-click** ((OS X) or **right-click** (Windows) the object and choose **Button Setup** from the contextual menu.
- Select the object and choose **Button Setup** from the **Format** menu.

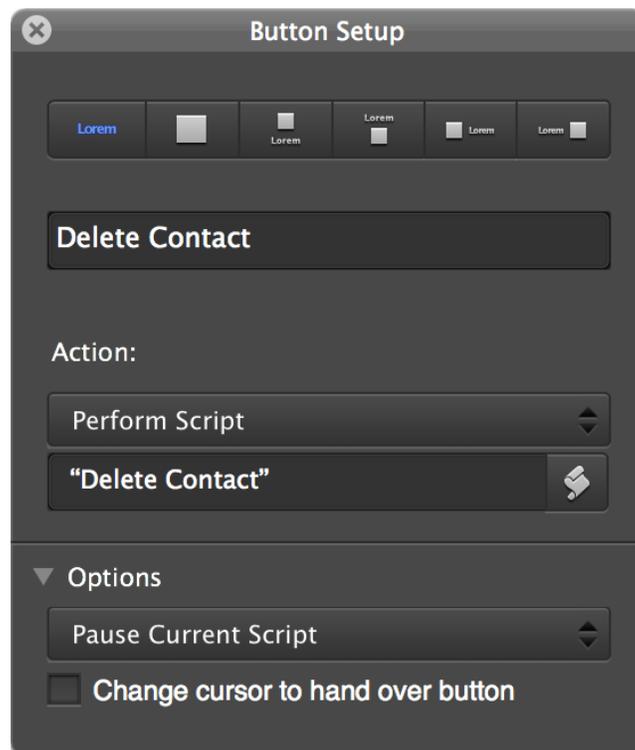


FIGURE 71

In the **Button Setup** dialog, typically you choose **Perform Script** in the **Action** drop down list and then specify which script to trigger. Buttons can also perform single script steps, which can be useful for simple navigation (for example, **Go To Layout**) or creating a record.

A new feature in FileMaker Pro 14 is the ability to display an icon on a button with or without accompanying text. The buttons at the top of the **Button Setup** dialog allow you to choose the position of the icon and text on the button. You can choose from a set of predefined icons included with FileMaker Pro, and you can also create custom icons. Adding custom button icons is covered in more detail in FileMaker Training Series: Advanced, Module 3 (Interface).

Another new feature in FileMaker Pro 14 is the **Button Bar** object. A **Button Bar** is a series of buttons that have a consistent appearance. **Button Bars** are useful for providing a navigation bar or displaying a series of actions a user may take on a layout such as New Record, Duplicate Record, Delete Record, etc. An example of a **Button Bar** is shown in Figure 72. **Button Bars** are covered in more detail in FileMaker Training Series: Advanced, Module 3 (Interface).



FIGURE 72

There are several scripts that need to be created in the Equipment Rentals solution to make it more useful for Equipment Providers, Inc.'s employees. Among these scripts are:

- A script to navigate to a list of Customers from the **Customer Details** layout.
- A script to make it easier to create new Customers and enter data for a new Customer by automatically navigating to the **Customer Details** layout and placing the user's cursor in the **Company** field upon creating a new record.

- A script to view a specific Customer's Assets in a list view.
- A script to export the found set of Assets to Excel.
- A startup script to navigate to the appropriate layout upon opening the file depending on the user's device.

These are examples of useful features that can make it easier for users to access different areas of a solution, find specific data, enter new data, and extract data from the system.

Activity 15.1: Creating a Navigation Script

Create a script that will allow the user to navigate to the **Customer List** layout from the **Customer Details** layout. You will add a button to the **Customer Details** layout that performs this script.

1. Open the **Script Workspace** by choosing **Scripts > Script Workspace...** or by using the keyboard shortcut **Command-Shift-S** (OS X) or **Ctrl-Shift-S** (Windows).
2. Click the **New** button () in the upper left hand corner of the dialog. Change the name of the script to "**Go to Customer List**".
3. Double-click the **Go to Layout** script step in the list of script steps to move it into the script editing area. Alternately, you can click in the script editing area and start typing "**Go to Layout**" to trigger the script step auto-completion functionality.
4. Click on the text "**original layout**" in the newly added **Go to Layout** step and choose **Layout...** in the drop down.
5. Choose the **Customer List** layout and click **OK**.

6. Save the script by choosing **Scripts > Save Script** or by pressing **Command-S** (OS X) or **Ctrl-S** (Windows). Close the script's tab panel by hovering over the blue panel containing the script's name and clicking the  icon. Close the **Script Workspace** window.
7. Navigate to the **Customer Details** layout and enter **Layout** mode.
8. Select the **Button** tool ( icon) from the **Status Toolbar**. Click and drag on the layout to create a button object in the header. The **Button Setup** dialog will appear.
9. At the top of the dialog, select the option to display an icon to the left of the button's text. In the table of icons, select the  icon (fourth icon in the first row) and make the icon's size 20 pts.
10. Type **Customer List** as the button text.
11. In the **Action** drop down, choose **Perform Script**.
12. Choose the **Go to Customer List** script and click **OK**. The **Button Setup** dialog should look like Figure 73.

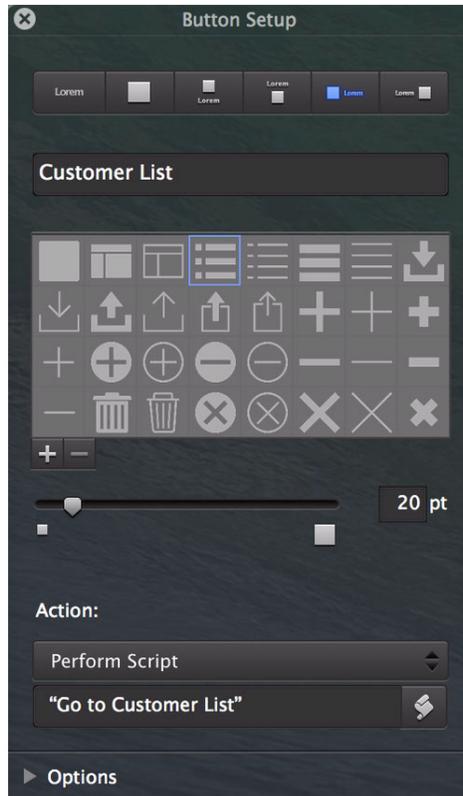
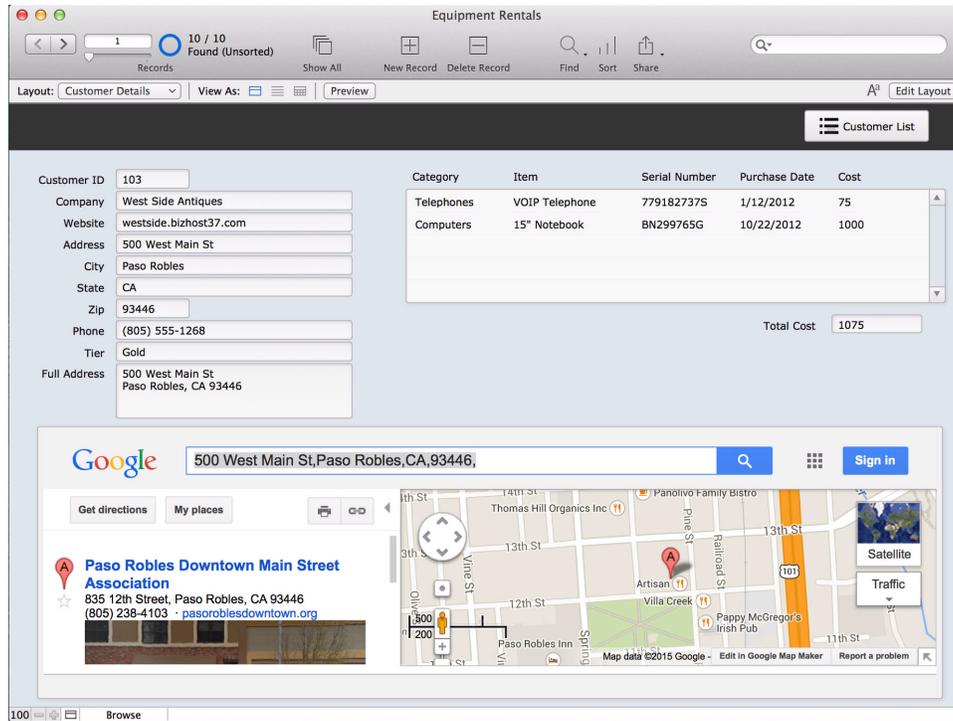


FIGURE 73

13. Enter **Browse** mode. The **Customer Details** layout should now look like Figure 74.

FileMaker Training Series: Basics for FileMaker 14



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FIGURE 74

Test the button to make sure it correctly navigates to the **Customer List** layout. The current record and found set do not change when navigating to the **Customer List** using this button; it simply navigates to the **Customer List** layout and displays the same set of records.

Single Step Scripts

Because this script only contains one script step, the same action could be accomplished by having the button execute the **Go to Layout** script step directly. Most script steps are available to be specified as a button's action when you select Single Step as the button's action in the **Button Setup** dialog. The limitation with this approach is that only one step can be specified. A script is

required for a button to perform multiple script steps in a sequence. It is considered a best practice to define scripts for all buttons in a solution, especially if the action will be repeated in more than one location in the solution. This is helpful if you later need to add a step to the process like sorting the records displayed in the list. Updating a single script is much more efficient than reviewing your entire solution and updating all the buttons that reference a certain script step.

The new **Convert to Script...** feature in FileMaker Pro 14 makes the process of switching from a single step to a script easier. When specifying the step that a Single Step button will execute, click the **Convert to Script...** button in the lower left corner of the **Button Action** dialog to automatically create a script with the single step included. It is important to note that the **Convert to Script...** button will not re-configure any other buttons in your solution to perform the script. You would still need to update other buttons in your solution to also run the new script if desired.

Activity 15.2: Script to Create a New Customer

Create a script that will create a new Customer record, navigate to the **Customer Details** layout, and place the user's cursor in the **Company** field. You will add a button to the **Customer List** layout that performs this script.

1. Open the **Script Workspace**.
2. Click the **New** button () in the upper left hand corner of the dialog. Change the name of the script to "**Create New Customer**".
3. Add the **Go to Layout** script step and set it to go to the **Customer Details** layout.
4. Add the **New Record/Request** script step.

5. Add the **Go to Field** script step. Click the gear icon () on the **Go to Field** script step, click **Specify...**, and choose the **Company** field in the **Customers** table.
6. Save the script and close the script's tab and the **Script Workspace** window.
7. Place a button in the header of the **Customer List** layout. Select the option to display an icon to the left of the button's text, select the  icon (last icon in the second row), and set the icon size to 20 pts.
8. Enter the text "Create New Customer" as the button's text and set it to run the newly created **Create New Customer** script. The **Customer List** layout should look similar to Figure 75 in **Browse** mode.

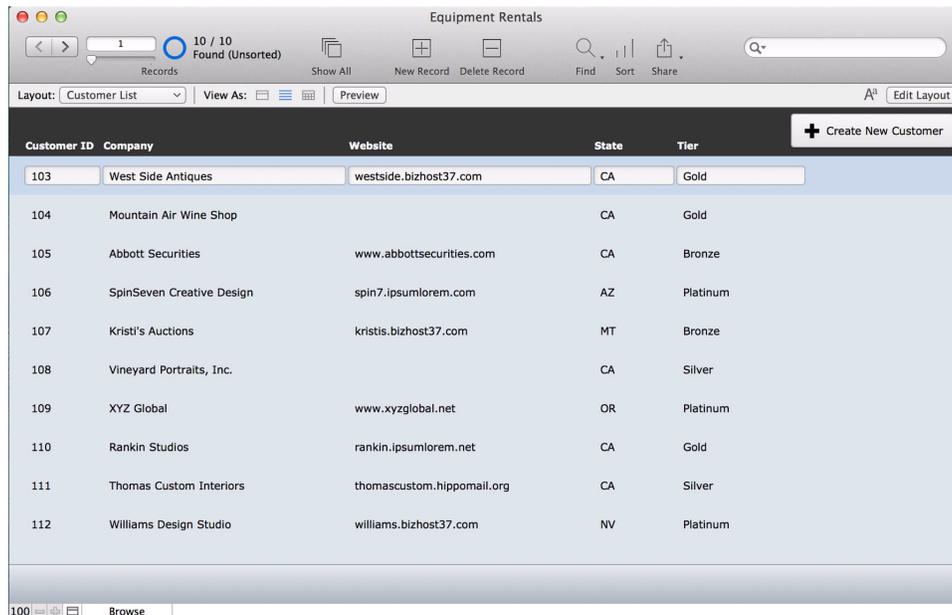


FIGURE 75

Test the button to make sure it correctly navigates to the **Customer Details** layout, creates a new Customer record, and place your cursor in the **Company** field.

Activity 15.3: Script to View a Customer's Assets

As mentioned previously, a common request from Equipment Providers, Inc.'s customers is to receive a list of Assets leased by the Customer. Customers do not have access to the solution, so Equipment Providers, Inc. will need to export the list of Assets to send to the Customer. The first part of this process is to provide an easy way for employees to navigate to a list of a specific Customer's Assets. In this activity you will create a script that will navigate to the **Asset List** layout and display only the current Customer's Assets, sorted by Category. You will add a button to the **Customer Details** layout that performs this script.

1. Open the **Script Workspace**.
2. Click the **New** button () in the upper left hand corner of the dialog. Change the name of the script to "**Go to Customer's Assets**".
3. Add the **Go to Related Record** script step. Click the gear icon () on the **Go to Related Record** script step.
4. On the **Go to Related Record Options** dialog, choose **Assets** in the **Get related record from:** drop down, select the **Asset List** layout for the **Show record using layout:** option, and check the **Show only related records** checkbox. Make sure the **Match current record only** radio button is selected. The dialog should look like Figure 76. Click **OK**.

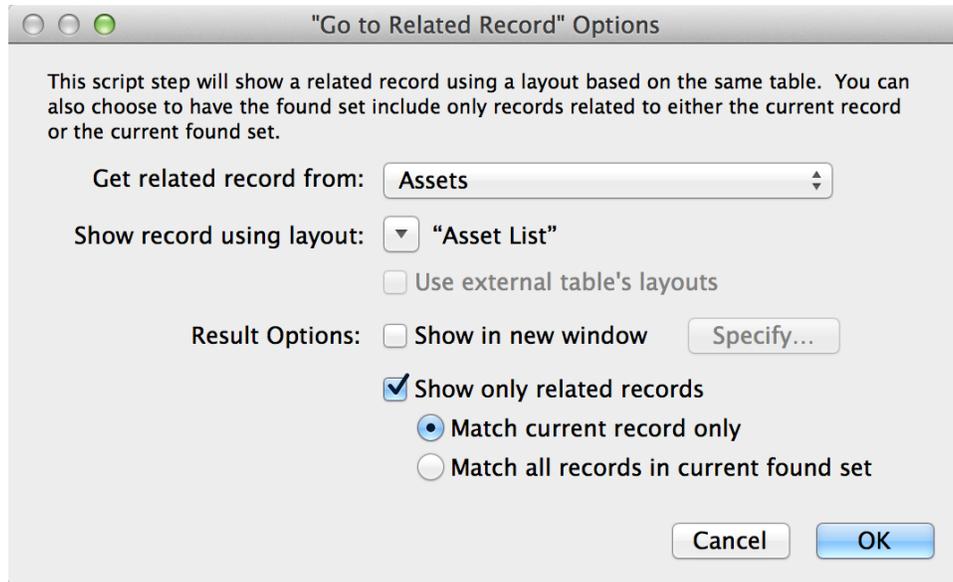


FIGURE 76

5. Add the **Sort Records** script step. Click the gear icon () on the **Sort Records** script step, check the **Perform without dialog** checkbox, click **Specify...**, and specify to sort by **Category** in ascending order. Click **OK** to dismiss the **Sort Records** dialog.
6. Add the **Go to Record/Request/Page** script step. Select **First** as the script step's parameter if it is not already selected. The script should look similar to Figure 77.

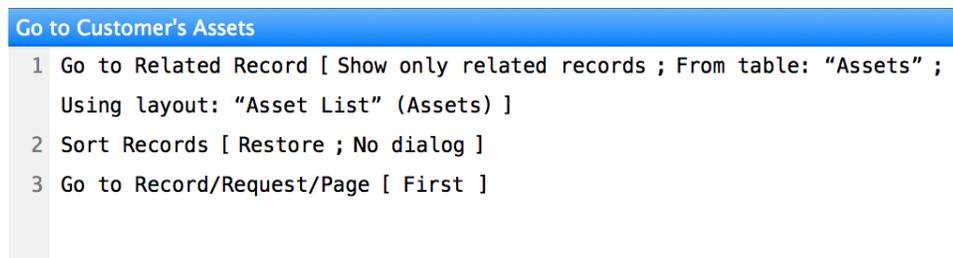


FIGURE 77

7. Save the script and close the script's tab and the **Script Workspace**.

8. Place a button in the header of the **Customer Details** layout. Select the option to display an icon to the left of the button's text, select the  icon (first icon in the eleventh row), and set the icon size to 20 pts.
9. Enter the text "**Go to Customer's Assets**" as the button's text and set it to run the newly created **Go to Customer's Assets** script.

Test the button to make sure it correctly navigates to the **Asset List** layout and displays only the current Customer's related Assets sorted by the **Category** field.

Activity 15.4: Script to Export Asset Data

Now you will create the script that exports the current found set of Assets. You will add a button to the **Asset List** layout that performs this script.

1. Open the **Script Workspace**.
2. Click the **New** button () in the upper left hand corner of the dialog. Change the name of the script to "**Export Assets**".
3. Add the **Export Records** script step. Click the gear icon () on the **Export Records** script step.
4. On the popover that appears, check the **Perform without dialog** checkbox, and click **Specify...** next to **Specify output file**.
5. On the **Specify Output File** dialog, click the **Add File...** button.
6. On the **Export Records to File** dialog, select your Desktop as the location for the exported file, change the file type to **Excel Workbooks (.xlsx)**, and change the file name to "Asset Export". Click **Save**.

7. On the **Specify Output file** dialog, change the Type to **Excel Workbooks (.xlsx)** and check the box labeled **Automatically open file**. The dialog should look like Figure 78. Click **OK** and click **OK** again to close the **Excel Options** dialog.

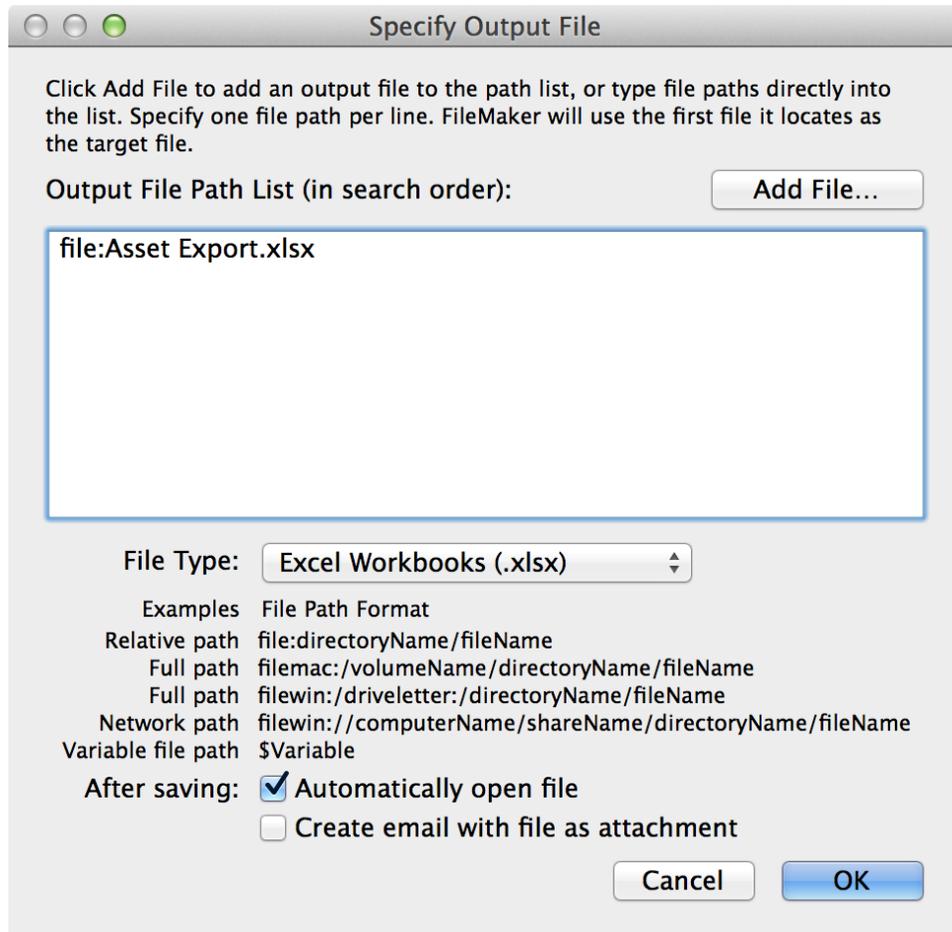


FIGURE 78

8. Click **Specify...** next to **Specify export order** on the script step options popover. If the popover is not open, click the gear icon () on the **Export Records** script step to open the popover.
9. On the **Specify Field Order for Export** dialog, click the **Clear All** button if there are fields listed in the **Field export order** box.

10. Select **Assets** in the table drop down menu. Click the **Item** field once to select it and click the **Move** button to move the field into the **Field export order** box. Also add the following fields to the export order: Model, Serial Number, Category, In Service Date, Purchase Date, Cost. You can **Shift-Click**, **Command-Click (OS X)**, or **Control-Click (Windows)** to select multiple fields to add to the export order. The **Specify Field Order for Export** dialog should now look like Figure 79.

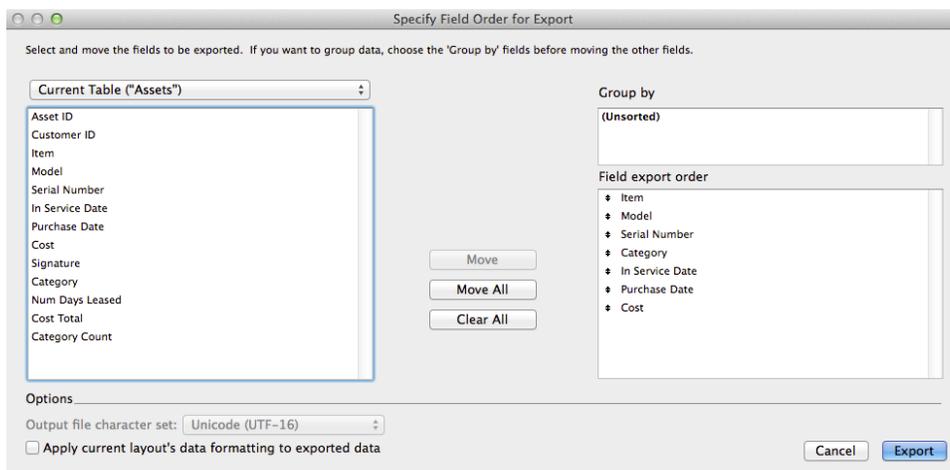


FIGURE 79

11. Click **OK** to close the **Specify Field Order for Export** dialog. Save the script and close the script's tab and the **Script Workspace** window.
12. Place a button in the header of the **Asset List** layout. On the **Button Setup** dialog, select the option to display an icon to the left of the button's text, select the  icon (second icon in the second row), and set the icon size to 20 pts.
13. Enter the text "Export Assets" as the button's text and set it to run the newly created **Export Assets** script.

Test the button to make sure it correctly exports the found set of Asset records as an Excel file on your desktop named "Asset Export".

Create email with file as attachment

In the **Specify Output File** dialog there is an option to automatically create an email with the exported file as an attachment. When this option is selected, an email is created in your default email application (such as Outlook or Mail) that you can then edit and send. This is useful when you know that an exported file will need to be emailed immediately without further modifications to the file. If you are using FileMaker Pro, this option requires that you have an email application installed on your computer.

LESSON 15

Section 6: Startup Script

It is often useful to trigger a script to execute when a user opens a solution. Common uses for this type of script are:

- Displaying a layout specifically designed for iOS if the user is using an iOS device.
- Navigating to a different table based on the needs of different user groups.

You will explore how to use the **OnFirstWindowOpen** script trigger to accomplish this.

For the Equipment Rentals file, iOS users are mainly technicians whose responsibilities include delivering, installing, and repairing assets for customers and are only interested in working with Asset records. The desktop users of the solution are the Equipment Providers, Inc.'s account managers who are more interested in viewing Customers than Assets because they routinely call or send letters to customers. To help these different types of users be more productive, the startup script in the Equipment Rentals solution should navigate to the appropriate area depending on the device being used.

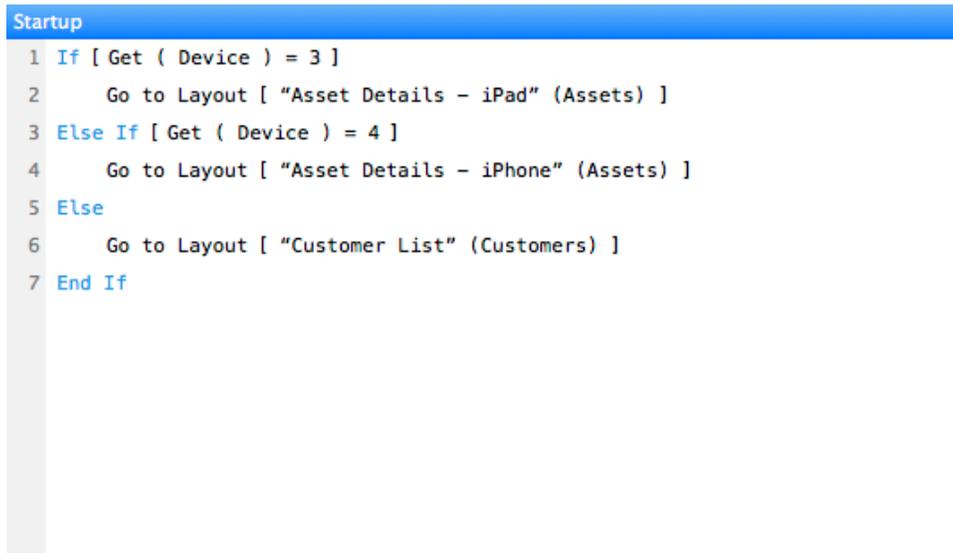
Activity 15.5: Creating a Startup Script

You will use a combination of the **If** script step and the **Get(Device)** function to check the user's device and have the script take different steps accordingly.

1. Open the **Script Workspace**.
2. Create a new script named **Startup**.

3. Add the **If** script step to the script. An **End If** step is automatically added to the script because every **If** step requires an **End If** step.
4. By default your cursor will be placed in the formula entry area for the **If** step. Enter the formula `Get(Device) = 3`. The **Get(Device)** function returns 3 if the user is on an iPad. Alternatively, you can open the **Specify Calculation** dialog to enter the formula by either clicking the  icon next to the **If** step or double-clicking the **If** step.
5. Add a **Go to Layout** script step to the script. Place the step directly after the **If** script step but before the **End If** script step by clicking and dragging it into position.
6. Change the **Go to Layout** script step to navigate to the **Asset Details - iPad** layout.
7. Double-click the **Else If** script step to add it to the script. The **Else If** step allows you to specify another condition to evaluate if the condition specified in the **If** step is false. The **Else If** step will only be executed when the condition specified in the **If** step is false.
8. Click in the formula entry area on the **Else If** step and enter the formula `Get(Device) = 4`. The **Get(Device)** function returns 4 if the user is on iPhone or iPod touch.
9. Add a **Go to Layout** script step between the **Else If** and **End If** script step. Change the **Go to Layout** script step to navigate to the **Asset Details - iPhone** layout.
10. Add an **Else** script step directly after the last **Go to Layout** script step but before the **End If** script step. The **Else** script step allows you to specify what the script should do if the conditions specified in the **If** and **Else If** steps are false, meaning the user is not using an iOS device.

11. Add a **Go to Layout** script step immediately following the **Else** script step. Specify that this **Go to Layout** script step navigates to the **Customer List** layout. The script should look similar to Figure 80.



```
Startup
1 If [ Get ( Device ) = 3 ]
2   Go to Layout [ "Asset Details - iPad" (Assets) ]
3 Else If [ Get ( Device ) = 4 ]
4   Go to Layout [ "Asset Details - iPhone" (Assets) ]
5 Else
6   Go to Layout [ "Customer List" (Customers) ]
7 End If
```

FIGURE 80

12. Save the script and close both the **Startup** script's tab panel and the **Script Workspace**.
13. Choose **File > File Options...** and go to the **Script Triggers** tab.
14. Check the box next to **OnFirstWindowOpen** and choose the **Startup** script. Click **OK** twice to close the **Specify Script** and **File Options...** dialogs.

To test the script, open the Equipment Rentals file from an iOS device. Refer to the deployment section for detailed instructions on transferring the file to an iOS device and opening the file with FileMaker Go.

If you do not have access to an iOS device, you can test that the script is executing properly on your computer by navigating to the **Asset Details - iPad** layout, closing the file, then reopening the file. The default behavior in FileMaker

Pro is to open a file with the last used layout, which was the **Asset Details - iPad** layout in this case, but if the **Startup** script executes properly, the file will open to the **Customer List** layout instead.

Lesson 15: Review Questions

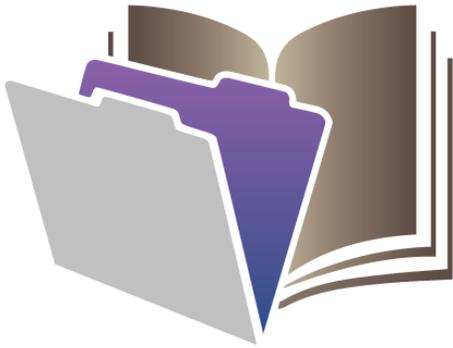
1. Where do a majority of script steps come from?
2. How do you configure a layout object to activate a script when the user clicks it?
3. What does the **OnFirstWindowOpen** script trigger allow developers to do?

Lesson 15: Review Answers

1. A majority of script steps come from menu items in Browse, Find, and Preview modes.
2. Any object on a layout can be turned into a button by using the **Button Setup** dialog, which is accessible from the object's contextual menu, or by choosing **Format > Button Setup**. Set the button to **Perform Script** and select the script you want to trigger.
3. Using the **OnFirstWindowOpen** script trigger, developers can create startup scripts that perform tasks such as taking users to layouts built for their specific needs, based on the device being used or a given user's account name.

Lesson 16

Reporting



Lesson 16: Reporting

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Describe how a subsummary report works.
- Explain the concept of a break field.
- Set up subsummary and grand summary parts.
- Define and use summary fields.
- Create basic subsummary reports.
- Create a chart using Quick Charts.

One of the most powerful features of FileMaker solutions is its ability to aggregate data and summarize it in a report. With the right reports, you can gain

insight into your business or meet your internal or regulatory compliance requirements. To create effective reports, you will need to know how to define fields, develop layouts, define calculations, and use scripts. In other words, you will need to harness all the skills you learned in previous lessons.

In this lesson, you will learn how to create a basic subsummary report using summary fields and layout parts. You will learn how to use subsummary parts to provide logical groupings of records and enhance the usability of a list layout. You will also learn how to make a chart using **Quick Charts**.

Here is what you learned about layouts from the **Getting Started Tour**.

Getting Started > Charting

- Create charts to compare and contrast data. You can chart individual data values (single items sold) or summary data (total sales per quarter)

Getting Started > Reporting

- FileMaker Pro can generate reports to help you organize and analyze your data.
- You can create custom reports by grouping data. Summary reports can include subtotals and grand totals.
- FileMaker Pro can print your report or email it as an Excel or PDF file.

LESSON 16

Section 1: Subsummary Reports

Before you begin building a report, you need to plan what kind of report you want. For the Equipment Rentals file, management has asked for a report that shows the total cost of Assets per Category so they can evaluate whether investment in assets is properly diversified across the different categories.

You can generate different reports using the same interface by using different found sets. For example, a layout that summarizes Assets by Category can potentially present all Assets or only those Assets that are currently in service.

The most powerful type of report in FileMaker Pro is the subsummary report, which presents a list of data grouped by the values in a specific field. In the Equipment Rentals solution, you have the data shown in Figure 81.

Asset ID	Customer ID	Customers::Company	Item	Category	In Service ...	Purchase ...	Cost	+
86000	108	Vineyard Portraits,	Desktop PC System	Computers	1/10/2011	1/9/2011	1200	
86001	110	Rankin Studios	Espresso Machine	Appliances	2/11/2011	1/27/2011	100	
86002	107	Kristi's Auctions	Microwave	Appliances	4/20/2011	3/17/2011	150	
86003	105	Abbott Securities	Desk Chair	Office Furniture	5/18/2011	3/26/2011	50	
86004	104	Mountain Air Wine	VOIP Telephone	Telephones	5/23/2011	4/18/2011	75	
86005	109	XYZ Global	Desk Chair	Office Furniture	6/14/2011	4/23/2011	50	
86006	107	Kristi's Auctions	Digital Camera	Cameras	5/20/2011	5/1/2011	300	
86007	110	Rankin Studios	Desk Chair	Office Furniture	7/13/2011	6/7/2011	50	
86008	110	Rankin Studios	Digital Camera	Cameras	7/22/2011	7/8/2011	300	
86009	111	Thomas Custom	VOIP Telephone	Telephones	8/28/2011	7/15/2011	75	
86010	112	Williams Design	Microwave	Appliances	1/10/2012	11/24/2011	150	
86011	103	West Side Antiques	VOIP Telephone	Telephones	3/9/2012	1/12/2012	75	
86012	109	XYZ Global	Desktop PC System	Computers	6/9/2012	4/18/2012	1200	
86013	108	Vineyard Portraits,	VOIP Telephone	Telephones	5/21/2012	5/16/2012	75	
86014	107	Kristi's Auctions	Desk Chair	Office Furniture	8/15/2012	8/13/2012	50	
86015	103	West Side Antiques	15" Notebook	Computers	10/25/2012	10/22/2012	1000	
86016	108	Vineyard Portraits,	Desk Chair	Office Furniture	12/5/2012	10/29/2012	50	
86017	107	Kristi's Auctions	15" Notebook	Computers	12/30/2012	12/15/2012	1000	
86018	109	XYZ Global	VOIP Telephone	Telephones	2/3/2013	12/25/2012	75	
86019	112	Williams Design	VOIP Telephone	Telephones	7/16/2013	6/26/2013	75	
86020	109	XYZ Global	Espresso Machine	Appliances	8/25/2013	7/3/2013	100	
86021	104	Mountain Air Wine	Espresso Machine	Appliances	10/4/2013	8/31/2013	100	
86022	112	Williams Design	Digital Camera	Cameras	10/12/2013	9/4/2013	300	
86023	105	Abbott Securities	VOIP Telephone	Telephones	10/13/2013	9/16/2013	75	
86024	106	SpinSeven Creative	15" Notebook	Computers	10/27/2013	10/9/2013	1000	
86025	110	Rankin Studios	Desktop PC System	Computers	11/17/2013	11/6/2013	1200	
86026	106	SpinSeven Creative	Desk Chair	Office Furniture	11/29/2013	11/8/2013	50	
86027	104	Mountain Air Wine	Digital Camera	Cameras	12/1/2013	11/15/2013	300	
86028	104	Mountain Air Wine	Desktop PC System	Computers	12/3/2013	11/30/2013	1200	

FIGURE 81

One report you can generate from this data is a subsummary by Category as shown in Figure 82.

Asset ID	Item	Purchase Date	In Service Date	Cost
Appliances				
86001	Espresso Machine	1/27/2011	2/11/2011	\$100.00
86002	Microwave	3/17/2011	4/20/2011	\$150.00
86010	Microwave	11/24/201	1/10/2012	\$150.00
86020	Espresso Machine	7/3/2013	8/25/2013	\$100.00
86021	Espresso Machine	8/31/2013	10/4/2013	\$100.00
Appliances				\$600.00
Cameras				
86006	Digital Camera	5/1/2011	5/20/2011	\$300.00
86008	Digital Camera	7/8/2011	7/22/2011	\$300.00
86022	Digital Camera	9/4/2013	10/12/201	\$300.00
86027	Digital Camera	11/15/201	12/1/2013	\$300.00
Cameras				\$1200.00

FIGURE 82

As you can see, this kind of report groups all the assets under a subheader for each category. Additionally, you can include a row at the bottom of each category that displays the total cost of assets in that category using a summary field.

When creating a subsummary report, the field used to group records is called the *break field*. In this example, **Category** is the break field. Typically, the break field is a field that contains consistent data across multiple records—such as category, type, status, and month—rather than a field with continuous or free-form data such as amount, description, or comment. The records are sorted by the break field, and whenever a new value is encountered in the sorted field's data, the report "breaks" and starts a new subsummary group.

Unlike creating layouts that require you to use the **Field Picker**, FileMaker Pro walks you through creating a report like this, including adding fields and adding subtotals and totals.

Subsummary Parts

To group records, you need to use a subsummary part. A subsummary part is a layout part that displays information for each group of records only when the found set is sorted by the break field. The subsummary part and its contents are not displayed at all if the found set is not sorted by the break field.

It is often useful to have two subsummary parts on a layout, one above the body and one below the body, with the same break field. This allows you to display a descriptive header for each group as well as a total or other aggregated data below the group. Figure 82 illustrates this approach. The header is the Category, and the aggregated data is the total cost of assets per Category.

You can also have many subsummary parts on a layout with different break fields specified. This is useful for displaying subgroups within groups. As long as you include the different break fields in your sort order, the records will be grouped by each break field.

Using multiple subsummary parts on a single layout can also be useful for reusing your report layout to create reports that are grouped by different fields. Simply by sorting the found set on a different break field, you can cause some subsummary parts to disappear and new ones to be displayed, resulting in a report that is grouped differently. It all depends on the break field associated with each subsummary part.

Summary Fields

Grouping records becomes more valuable when you utilize summary fields to aggregate data for each group. A summary field aggregates data across a group of records. Summary fields are created via the **Manage Database** dialog. You can choose options for summary fields through the **Options for Summary Field** dialog as shown in Figure 83. The most common summary operations you will use are **Total of**, **Average of**, and **Count of**.

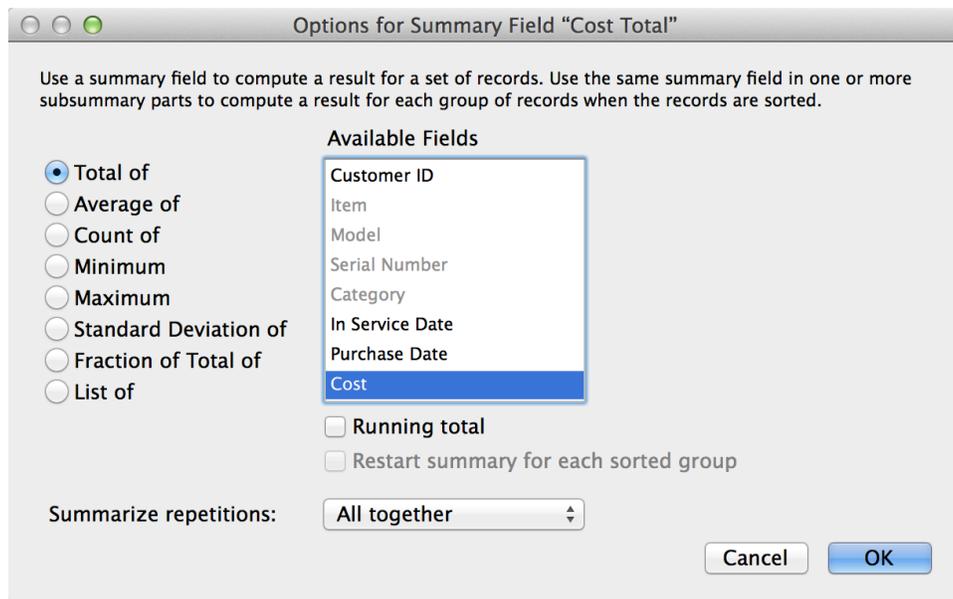


FIGURE 83

When a summary field is placed in a header, footer, body, navigation, or grand summary part, it aggregates the values from the specified field across all records in the found set. When a summary field is placed in a subsummary part, it displays aggregate information about each subgroup of records. This means you can use the same summary field to total the cost of assets for each category in a subsummary part, and also to total the cost of all assets in the found set in a grand summary part.

Activity 16.1: Creating a Subsummary Report

1. Go to **Layout** mode and choose **Layouts > New Layout/Report...**
2. Choose **Assets** in the **Show records from** drop-down and name the new layout "**Asset Report**".
3. Click on **Computer** and then choose **Report**. Click **Continue**.
4. Make sure the options to include subtotals and grand totals are activated and click **Next**.
5. Double-click on the following fields from the Assets table to specify them for the report:
 - Asset ID
 - Item
 - Purchase Date
 - In Service Date
 - Cost
 - Category
6. Click **Next**.
7. Double-click on **Category** in the **Organize Records by Category** screen. Click **Next**.
8. Double-click on **In Service Date** to also sort by that field in addition to **Category**. Your screen should look like Figure 84, then click **Next**.

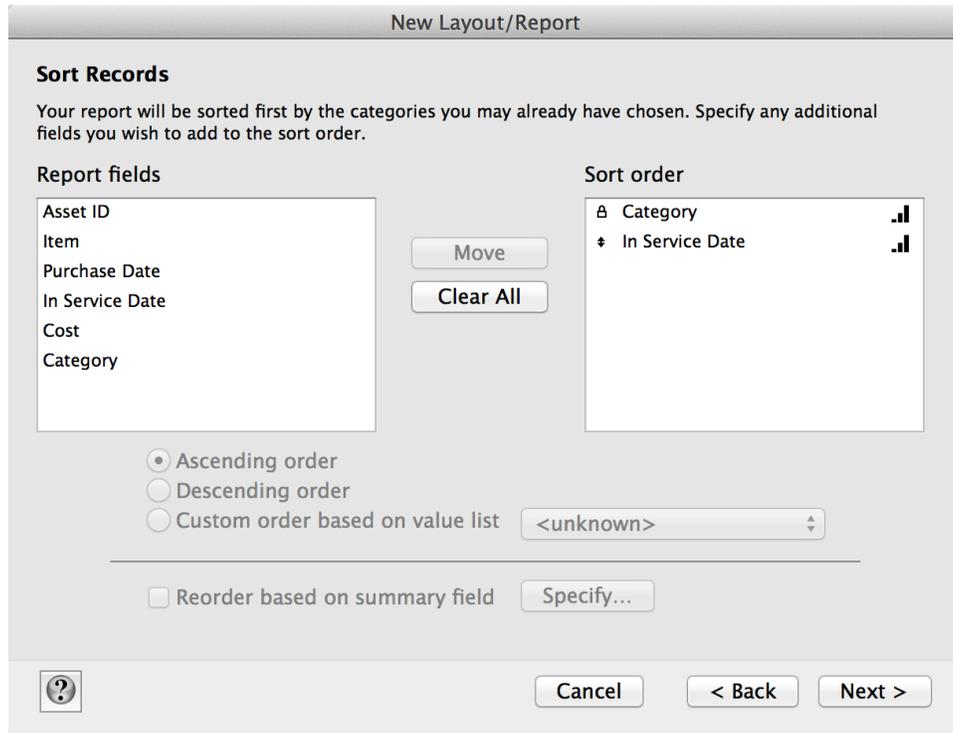


FIGURE 84

9. Under **Summary** field, click **Specify...** You have not yet created a summary field.
10. Click **Add**. Name the field **Cost Total**, choose **Total of** from the options on the left side of the dialog, and choose **Cost** from the field names.
11. Click **OK** to create the field and click **OK** again to choose the newly created field.
12. Click **Add Subtotal** and click **Next**.
13. On the **Specify Grand Totals** screen click **Specify...**, choose **Cost Total**, and click **OK**.
14. Click **Add Grand Total** and click **Next**.

15. On the **Header and Footer Information** screen, choose **Layout Name** in the drop-down for **Top left** and **Current Date** in the drop-down for **Bottom right**. Click **Next**.
16. Click **Create a script**, name it "**Asset Report**", and check the **Run script automatically** checkbox. This will add an **OnLayoutEnter** Script Trigger so that when a user goes to the **Asset Report** layout, the script will automatically sort the records. Click **Finish**.
17. Remove the **Category** field from the Body and its label from the Header.

A new layout will be created with the fields, subsummary parts, and the trailing grand summary that you specified. The process will do its best to properly size fields, but some adjustment might be needed. After resizing and moving fields, and applying the Vibrant theme and data formatting, your report should look similar to Figure 85. Note that after exiting **Layout** mode you may need to run the **Asset Report** script by choosing **Scripts > Asset Report** in order for the report to be grouped correctly. Notice that the **Category** field has been removed from the body part in Figure 85. Since the report will always sort, it is unnecessary to show the Category on each row.

Asset ID	Item	Purchase Date	In Service Date	Cost
Appliances				
86001	Espresso Machine	1/27/2011	2/11/2011	\$100.00
86002	Microwave	3/17/2011	4/20/2011	\$150.00
86010	Microwave	11/24/201	1/10/2012	\$150.00
86020	Espresso Machine	7/3/2013	8/25/2013	\$100.00
86021	Espresso Machine	8/31/2013	10/4/2013	\$100.00
Appliances				\$600.00
Cameras				
86006	Digital Camera	5/1/2011	5/20/2011	\$300.00
86008	Digital Camera	7/8/2011	7/22/2011	\$300.00
86022	Digital Camera	9/4/2013	10/12/201	\$300.00
86027	Digital Camera	11/15/201	12/1/2013	\$300.00
Cameras				\$1200.00

FIGURE 85

After you perform a find on any layout based on Assets, running the **Asset Report** script by choosing **Scripts > Asset Report** will generate the report using the current found set. This provides a great deal of flexibility in terms of reusing the report with any found set.

Using Subsummary Parts to Enhance User Experience

Subsummary parts are also useful for enhancing the usability of list layouts in a solution. Grouping records based on descriptive data like region, status, or category can make it easier for users to locate records. All that is needed to implement this grouping technique is a subsummary part and a script to sort records by the break field.

Activity 16.2: Adding Groups to a List View

In this activity you will add subsummary parts for the **State** and **Tier** fields on the **Customer List** layout and also create the scripts to sort Customer records by those fields.

1. Navigate to the **Customer List** layout and enter **Layout** mode.
2. Choose **Layouts > Part Setup...** and click **Create...** on the **Part Setup** dialog.
3. Select the radio button labeled **Sub-summary when sorted by** and select the **State** field. Click **OK** and click **Print Above**. Click **Done** to close the **Part Setup** dialog.
4. Duplicate the **State** field in the body of the **Customer List** layout and place it in the left side of the subsummary part. Remove the field's border and make its text larger and bold to make it look more like a subheading.
5. Open the **Script Workspace** and create a new script named "**Sort Customers by State**".
6. Add the **Sort Records** script step and configure it to sort records by the **State** field in ascending order. Make sure to check the box for **Perform without dialog**.
7. Save the script and close both the script's tab panel and the **Script Workspace**.
8. Add a button in the header of the **Customer List** layout labeled "**Group by State**", set it to display the  icon (second icon in the eleventh row) to the left of the text, and set it to perform the **Sort Customers by State** script.

- Repeat steps 2-8 for the **Tier** field. Note that the order of the two subsummary parts does not matter for this activity. The **Customer List** layout should look similar to Figure 86 in **Layout** mode. Figure 87 shows how the layout should look in **Browse** mode when records are sorted by the **State** field.

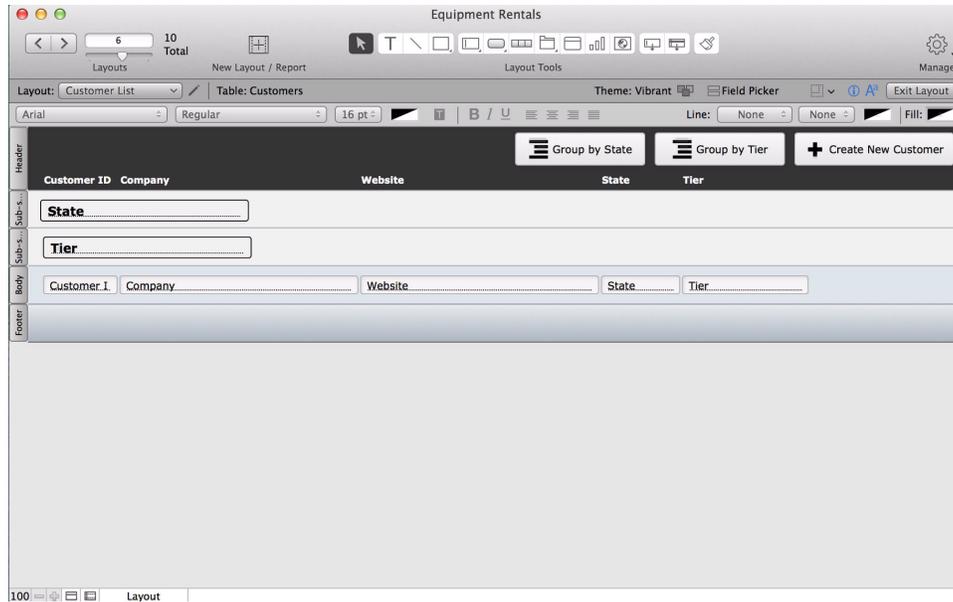


FIGURE 86

FileMaker Training Series: Basics for FileMaker 14

The screenshot shows the FileMaker 14 interface for a database named "Equipment Rentals". The layout is "Customer List" and shows 10 records sorted. The table is grouped by state, with sub-summary parts for AZ, CA, and MT. The CA group is currently selected, showing records 103 through 111. The table has columns for Customer ID, Company, Website, State, and Tier. The CA group is further grouped by tier, with sub-summary parts for Gold, Bronze, and Silver. The AZ group has a sub-summary part for Platinum. The MT group is currently empty.

Customer ID	Company	Website	State	Tier
AZ				
106	SpinSeven Creative Design	spin7.ipsumlorem.com	AZ	Platinum
CA				
103	West Side Antiques	westside.bizhost37.com	CA	Gold
104	Mountain Air Wine Shop		CA	Gold
105	Abbott Securities	www.abbottsecurities.com	CA	Bronze
108	Vineyard Portraits, Inc.		CA	Silver
110	Rankin Studios	rankin.ipsumlorem.net	CA	Gold
111	Thomas Custom Interiors	thomascustom.hippomail.org	CA	Silver
MT				

FIGURE 87

Try clicking the “**Group by State**” and “**Group by Tier**” buttons. Notice that only one of the subsummary parts is displayed at a time. If you were to sort records by both the **State** field and the **Tier** field at the same time then both subsummary parts would be displayed.

LESSON 16

Section 2: Charts

People process images much more quickly than words. As a result, visual displays of information are often easier to interpret than written reports presenting the same data. For example, charts can help illustrate changes in prices over time, the relative performance of a group of students, and much more.

There are two ways to create charts in FileMaker Pro. The first method, using the **Quick Chart** feature, gives users the ability to chart their data in just a few minutes. The second method offers greater flexibility and involves placing a chart object on a layout and manually defining the data series to be rendered. You can move, resize, and manipulate a chart object just as you do other layout objects, and you can customize the colors, fonts, and backgrounds of a chart. When using FileMaker Go and FileMaker WebDirect, charts can be viewed but not created or edited.

In FileMaker Pro, you can create ten types of charts: column, stacked column, positive/negative column, bar, stacked bar, line, area, pie, scatter, and bubble. Over time you will learn which types of charts are best for different types of data, so you can communicate your data more effectively.

Quick Charts

The easiest way to familiarize yourself with the charting features of FileMaker Pro is to experiment with **Quick Charts**, which can be created from any layout in

Browse mode. They are based on the current found set and the current sort order, so check both before you generate a **Quick Chart** to make sure they contain the data you want to use.

Activity 16.2: Creating a Quick Chart

You will create a **Quick Chart** that shows the number of Assets per Category for the found set.

1. Go to the **Asset Details - iPad** layout.
2. Click **Show All** in the **Status Toolbar** if you are not showing all records.
3. Sort the data by the **Category** field.
4. Right-click in the **Category** field and choose **Chart by Category...**. The **Chart Setup** dialog will appear, as shown in Figure 88.



FIGURE 88

5. Change the **Title** of the chart to "**Assets by Category**".
6. Click on the **Styles** panel and change the **Chart Style** to **Shaded - 3D**.
7. Click the **Save as Layout...** button to save the chart as a new layout.
8. Name the new layout "**Assets by Category**" and click **OK**.

The newly created chart layout will appear in a new window. Note that FileMaker Pro automatically creates a script with the same name as the layout and assigns it to the **OnLayoutEnter** script trigger for the new layout. In order to display the chart, first you must sort your found set by **Category**. This script automates that task for you.

Lesson 16: Review Questions

1. What is a break field, and how do you use it to define a subsummary part?
2. How do you add a new subsummary part to a layout?
3. Name three common summary operations, and explain what results they return for a group of records.
4. When does a subsummary part appear in **Browse** mode?
5. What FileMaker product allows you to create **Quick Charts**?
6. Which FileMaker products can you use to view charts?

Lesson 16: Review Answers

1. Use a break field to divide a found set of records into groups. When you create a subsummary part, you specify the break field. If the records are sorted by the break field, whenever the value of the break field changes, the report "breaks" by displaying a subsummary and starting a new subsummary group.
2. To add a subsummary part to a layout, go to the **Layouts** menu, then choose **Part Setup** to use the **Part Setup** dialog. Create the new part, then define the option to be **Sub-summary when sorted by**. Choose the break field you want from the list of fields in the **Part Definition** dialog.
3. The most common summary field operations are aggregating the total, count, or average of the values from a particular field. **Total** adds the values for all records in the specified field; **Count** returns the number of records that contain a value in the specified field; and **Average** finds the average for those records that contain a value in the specified field—in other words, empty records are not included. For example, if a set of five records contains the values of 100, blank, 200, 300, and 200 for a given field, the total for that field is 800, the count is 4, and the average is 200.
4. A subsummary part appears only when you sort records by the field you define as the break field for the subsummary part.
5. Only FileMaker Pro can be used to create **Quick Charts**.
6. FileMaker Pro, FileMaker Go, and FileMaker WebDirect can all view charts.

Lesson 17

Integration



Lesson 17: Integration

Lesson Overview

Time

This lesson take approximately 20 minutes to complete.

Objectives

After this lesson, you will be able to:

- Export data in common formats.
- Save layouts to PDF.
- Describe the differences among FileMaker's ODBC options.

The FileMaker Platform uses industry standards to allow it to share information with other technologies, whether a FileMaker database is the data source or whether the solution looks to outside sources. FileMaker's comprehensive integration features include:

- Importing from common file formats such as Excel and comma- or tab-separated.
- Importing from XML or ODBC data sources.
- Exporting to common formats such as Excel, comma- or tab-separated text, XML, and HTML.

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- Saving data to PDF files and appending data to existing PDF files.
- Making live connections to SQL data sources (Oracle, MySQL, Microsoft SQL Server).
- Using ODBC/JDBC to access other data sources.
- Serving as an ODBC and JDBC data sources.
- Accessing the source code of web pages.
- Supporting HTML5 via the Web Viewer.
- Authenticating with Active Directory and Open Directory.
- Supporting plug-ins to extend functionality.

FileMaker may also initiate and steer activity in the local operating system with:

- Support for AppleScript on OS X and the ability to launch a VBScript file on Windows OS.
- The ability to send email, dial phones, and generate event commands to local applications (such as to bring other applications to the foreground).
- Support for custom URL protocols to open FileMaker files, pass variables to and run scripts in those files.

Here is what you learned about exporting records from the **Getting Started Tour**.

Getting Started > Exporting Records

- You can export data to another FileMaker Pro file or to another file format, such as Microsoft Excel.

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- FileMaker Pro exports a copy of your data, leaving the original data in the database.

LESSON 17

Section 1: Sharing Data With Outside Users

The FileMaker Platform provides many options for sharing data with people who don't have access to a FileMaker client application. You can export data to multiple file formats. One typical example is exporting mailing address data to share with colleagues. FileMaker Pro also allows you to share by creating a PDF of your layouts. This can be used to generate data driven communication like letters, invoices, or estimates. You can even save records as Microsoft Excel files with a single command.

Exporting Records

FileMaker Pro enables you to export data to other file formats, allowing data from a FileMaker solution to be viewed in other applications. The supported export file formats are:

- FileMaker Pro (.fmp12)
- HTML table (.html)
- Merge (.mer)
- Microsoft Excel (.xlsx)
- Tab-Separated Text (.tab or .txt)
- Comma-Separated Text (.csv or .txt)

- XML (.xml)
- dBase format (.dbf)

There are two commands in the **File** menu to export data:

- **Export Records** - allows you to select which fields to export as well as the format of the exported data file.
- **Save/Send Records As** - automatically exports the fields on the current layout to either a PDF or Excel file.

Both methods export the current found set, which is useful for exporting a specific data set. For example, you might find all active clients or the current month's orders and then export them to share with others.

Activity 17.1: Using Export Records

In this example you will export an HTML table of customer addresses for a direct mail service.

1. Navigate to the **Customer Details** layout and click **Show All Records** in the **Status Toolbar**.
2. In the **File** menu, choose **Export Records....**
3. Name the file "**Customer Export**" and choose the **Desktop** as the save location.
4. In the **Type** pop-up menu, choose **HTML Table** and click **Save**.
5. In the **Specify Field Order for Export** dialog, move the **Company**, **Address**, **City**, **State**, and **Zip** fields to the **Field** export order box on the right, as shown in Figure 89, by **double-clicking** each field or selecting the field on the left and clicking the **Move** button.

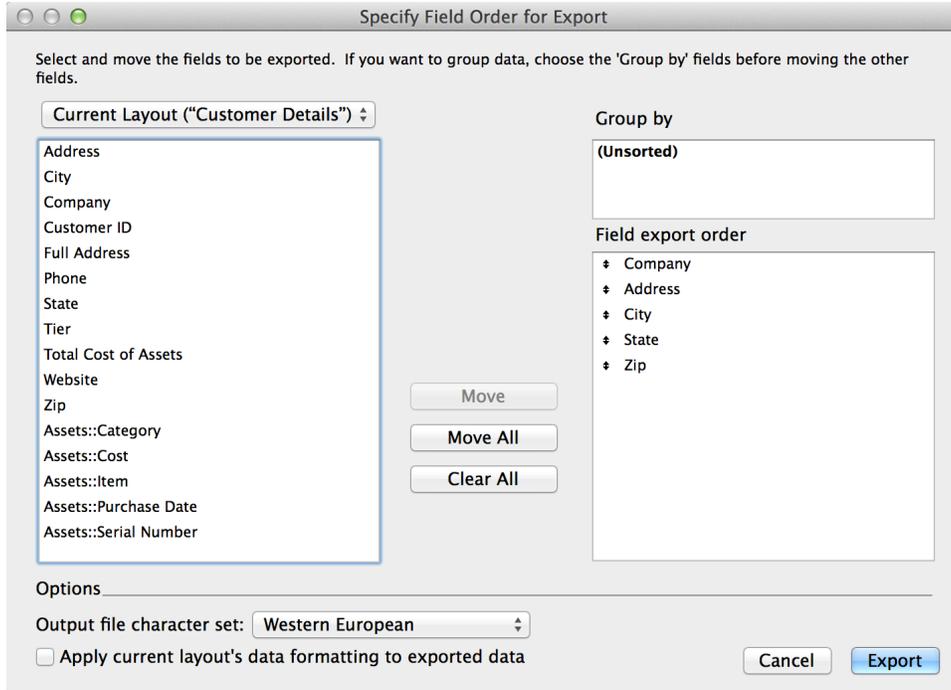


FIGURE 89

6. Click the **Export** button and open the newly created Customer Export.htm file to verify the results.

Saving as a PDF

FileMaker Pro has built-in functionality for saving data as Adobe® PDF files. A user can create a PDF file that matches the current layout's printed output and that can easily be shared with stakeholders. To do this, go to the **File** menu and select **Save/Send Records As > PDF...**

There are many options available when saving data as a PDF file, including the ability to specify the creator, title, and keywords, and to password protect the file. You can also choose to create a new email with the file attached and/or set

the file to automatically open after saving. Using a script, you can also append new pages to an existing PDF.

LESSON 17

Section 2: Integrating with Other Data Sources

Integrating a FileMaker solution with external systems can enhance its value and extend its capabilities. Many situations may require you to get data from or send data to an external system. For example, you might have an enterprise-level inventory system, but use FileMaker Pro for the majority of the workflow and reporting for your workgroup. Or perhaps you use FileMaker Pro for your web store's content management, but serve the actual website content from an SQL database.

LESSON 17

Section 3: What Is ODBC?

You have seen how to incorporate the Web in a FileMaker Pro solution, but what if you need to import data from another system or want your FileMaker solution to serve as the data source for another application? To do this, you will need to utilize the ODBC capabilities of the FileMaker Platform. Open Database Connectivity (ODBC) is the technology that allows FileMaker Pro to access data from external data sources as well as act as the data source for another system.

FileMaker Pro can connect to the following ODBC data sources, among others: Microsoft SQL Server, MySQL, Oracle, and Microsoft Access. Generally, the SQL database language is used by most of these. However, ODBC can be used to connect to other data sources as well, so long as a compatible ODBC driver is installed on your computer and the proper Data Source Name (DSN) is configured.

There are three different ways to interact with an ODBC data source: External SQL Sources (ESS), importing from an ODBC data source, and the **Execute SQL** script step. The following sections will cover the basics of these three methods.

External SQL Sources (ESS)

ESS is a feature that allows you to add “shadow” tables from remote SQL sources to your database file, working with them as though they were native FileMaker tables. Your users can search for, create, edit, and delete records in

the SQL data table directly. You can add table occurrences to the Relationship Graph, establish relationships (even between FileMaker tables and SQL tables), and view live SQL data alongside FileMaker data.

When using the ESS feature in files hosted via FileMaker Server, you configure ODBC drivers and DSNs only on the server machine, rather than on each individual desktop running FileMaker Pro. The seamless integration of the SQL table into FileMaker Pro and the consolidation of the ODBC driver and DSN setup to the server machine make ESS the preferred method of integrating with SQL data sources.

ESS is limited to Oracle, MySQL, and Microsoft SQL Server. Consult the FileMaker website for more information, including supported versions and appropriate drivers.

Import from ODBC Data Sources

Importing records from an ODBC data source is a one-way form of integration between the ODBC data source and your FileMaker Pro database. Using this technique, there is no way to edit the data that exists in the ODBC source. After importing the data into FileMaker Pro it is possible to edit the data, but the changes will not affect the original data source.

Unlike ESS, this import capability works with any ODBC data source for which you can access an appropriate driver, allowing FileMaker Pro to interact with a wide variety of ODBC-based data sources.

To import records from an ODBC source, you will need to have the appropriate ODBC driver installed on each computer from which you intend to use the feature, as well as an appropriate DSN configured on each machine. This is

unlike the ESS feature that permits the consolidation of drivers and DSNs onto the server alone.

Execute SQL Script Step

The **Execute SQL** script step allows a FileMaker Pro solution to send SQL statements to a remote SQL data source. In some ways, it is the mirror image of the ODBC import functionality. While the ODBC import capability can search for and import records, but cannot change data in the ODBC data source, the **Execute SQL** script step can run commands that change data in the ODBC data source, but cannot retrieve and display records within FileMaker Pro. The two features used together can thus provide full, two-way integration with an ODBC data source.

This feature, like the ODBC import feature, relies on ODBC drivers and DSNs installed on each FileMaker Pro client computer, or on FileMaker Server when the **Perform Script on Server** script step is used to call the **Execute SQL** script step (refer to FileMaker Training Series: Advanced, Module 5 (Solution Logic: Scripting) for information on the **Perform Script on Server** script step). It will work with a very wide variety of ODBC drivers and data sources. The **Execute SQL** script step requires knowledge of SQL to be used effectively.

Lesson 17: Review Questions

1. What are the two ways to export data out of your solution?
2. What file formats can **Save/Send Records As...** produce?
3. What are the major benefits to using ESS (External SQL Sources) over the other ODBC techniques?

Lesson 17: Review Answers

1. Two ways to export data out of your solution are **Export Records** and **Save/Send Records As...**
2. **Save/Send Records As...** can produce Excel (.xlsx) and PDF (.pdf).
3. ESS allows users to search for, create, edit, and delete records in an SQL data table directly without writing any SQL. If FileMaker Server is used to manage the connection, it removes the need to install ODBC drivers on multiple devices. It also lets you use the **Perform Script on Server** script step to interact with the SQL source, providing FileMaker Go and FileMaker WebDirect clients with indirect access to the SQL data, which they otherwise would not have.

Lesson 18

Security



Lesson 18: Security

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Objectives

After this lesson, you will be able to:

- Explain the purposes of accounts, passwords, and privilege sets.
- Enable and disable the default login account.
- Create and manage accounts and privilege sets.
- Explain how external authentication works and why it is useful.
- Articulate the purpose of the reauthentication extended privilege.

Security is a primary concern for both developers and end users. It governs whether or not a person can open a given file and determines which functions and data are accessible.

This lesson will introduce you to the FileMaker Platform's built-in security settings. You will incorporate many different aspects of FileMaker security into the Equipment Rentals file.

Depending on your security compliance and certification requirements, there may be other features that you will need to learn beyond what is covered here.

When securing a solution there are three principles to consider:

- Confidentiality — You have a responsibility to ensure that unauthorized people cannot access the data.
- Integrity — You have a responsibility to allow authorized users to create and update data while preventing unintentional changes. You must also restrict access to unauthorized users who may tamper with the files.
- Availability — You have a responsibility to ensure that the data is available to users when it is needed.

The FileMaker security model is based on two key components:

1. Accounts — identify the individual users.
2. Privilege Sets — define access limits for the user(s).

In this lesson, you will learn about these two key components.

LESSON 18

Section 1: Prompt for Login

The first step when dealing with security is to change the login settings that are configured automatically when you create a new FileMaker Pro file. By default, a new FileMaker Pro file contains an account named **Admin**, with no password, assigned to the **[Full Access]** privilege set. The file is configured to automatically login with this account. The **Full Access** privilege set allows unrestricted access to the file, including all development functions. As long as this default login remains in place, security is effectively bypassed.

Activity 18.1: Enable Security Settings

The Equipment Rentals file currently has the default security settings. Change the default settings to prompt users for a password, and give the Admin account a password.

1. Choose **File > File Options...** and uncheck the **Log in using** checkbox (Figure 90).

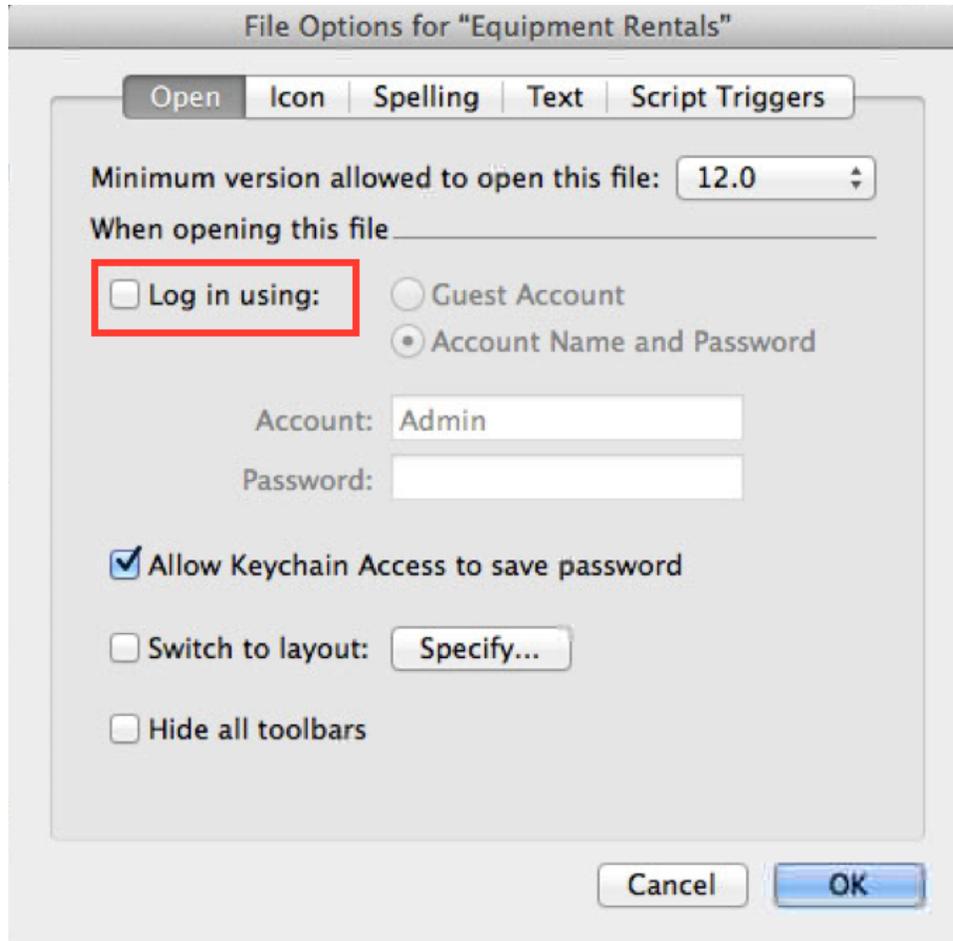


FIGURE 90

2. Click **OK**. The automatic login behavior is now disabled. The next required step in securing the file is to enter a password for the Admin account.
3. Choose **File > Manage > Security...** to open the **Manage Security** dialog. A security alert dialog will appear informing you that the **Admin** account does not have a password. The **Manage Security** dialog and security alert are shown in Figure 91. If this security alert does not appear upon opening the **Manage Security** dialog because you are in the **Detailed Setup** security dialog, click **Use Basic Setup...** and click **Allow** on the alert that appears in order to navigate to the **Basic Setup** dialog. The security alert shown in Figure 91 should then appear. The

Detailed Setup security dialog is covered in detail in FileMaker Training Series: Advanced, Module 7 (Security).

4. Click the **Set Password** button.



FIGURE 91

5. Enter **abcde** for the password and click **Set Password**. Click **OK** again to close the **Manage Security** dialog.
6. On the **Confirm Full Access Login** dialog, enter **Admin** as the full access account and **abcde** as the password and click **OK**.

To test these changes, close and reopen the file. You should now be prompted to login when you attempt to open the file. Keep full access passwords in a secure place. If they are lost, you may not be able to gain full access to the file again. Note that passwords are case sensitive but account names are not.

LESSON 18

Section 2: Accounts

An account and password combination is the primary means of authenticating a user and is required to access any FileMaker solution. You can create as many accounts in your FileMaker solution as necessary, assigning a privilege set to each one in order to establish its specific access privileges.

Accounts can be authenticated either internally or externally. With internal authentication (via FileMaker), the account name and password are stored within the database file itself. One of the benefits of using internal authentication is that all of the security setup in a solution is handled within FileMaker Pro without the need for an external server or FileMaker Server software. This makes it the quicker and easier option for managing accounts.

In the case of external authentication (via Open Directory or Active Directory), FileMaker stores only the name of a user group, interacting with an external server to authenticate a user's account and password. External authentication requires that the database is hosted with FileMaker Server and that FileMaker Server be configured to allow external authentication (enabled by a single drop-down in the FileMaker Server Admin Console).

External authentication still requires a user to provide an account name and password, but instead of FileMaker Server verifying those credentials itself, it passes the credentials to the directory service. The directory service verifies the user's credentials and sends back a list of all the groups to which the user belongs. This list is then compared to the group names in your FileMaker file, and the first valid match determines the privilege set available to the user.

One of the benefits of external authentication is that you do not need to set up individual user credentials in every FileMaker file in your solution. The solution access can be centrally managed using the same tools most organizations have in place for granting access to other network services. This can save you a lot of time if your solution contains many FileMaker files.

Another benefit is that users do not have to memorize solution-specific credentials. The same credentials that give them access to their other company systems also give them access to the databases that they need to access.

Whether the account information is stored internally or externally, it is common practice to have an account for each user. This is useful because it allows you to track who is creating or modifying individual records or taking other actions in your solution. You can accomplish this using auto-enter field settings or by using the **Get(AccountName)** function in calculations and scripts. The functionality to track this information works the same with both internal and external authentication.

LESSON 18

Section 3: Privilege Sets

A privilege set is a specific set of rights given to one or more accounts to access certain parts of your system, such as data, layouts, fields, and scripts. By default, a new FileMaker Pro file contains three predefined privilege sets:

- **Full Access** allows users to have complete access to the file, including all development functions (which are required for access to the **Manage Database** and **Manage Security** dialogs).
- **Data Entry Only** allows users to create, edit, and delete records and to import and export data. Users cannot access any development functions.
- **Read-Only Access** allows users to view and export record data. Users cannot modify the file.

Developers and administrators of a database are usually given accounts associated with the **[Full Access]** privilege set. Full access privileges are required to access the **Manage Database** and **Manage Security** dialogs, and no other privilege set can be configured to grant these abilities.

You cannot change or delete these predefined privilege sets, except to assign extended privileges. You can, however, create new privilege sets to meet your specific requirements.

A privilege set can be used by any number of accounts. Typically one account is created for each user, and a privilege set for each user group. User groups could be defined as the different departments that use a solution (Sales, Accounting, Marketing, etc.) or a hierarchy of positions within a company (Staff, Managers, Executives, etc.) for example.

Privilege Sets comprise the following access options:

- **Data Access** and **Design Privileges** provide access to a wide range of security control, including records, layouts, value lists, and scripts.
- **Extended Privileges** determine the data access methods that are permitted for a privilege set.
- **Other Privileges** allow printing, exporting, and some other functions.

One noteworthy feature of the **Data Access** and **Design** privileges is the ability to define privileges for specific tables, fields, layouts, scripts, and value lists by using the **Custom Privileges...** option. You can even use a calculation formula to determine record access privileges. For example, based on a user's account name, you could allow that user to edit only those records assigned to him or her. Using calculations for record level privileges is covered in more detail in FileMaker Training Series: Advanced, Module 7 (Security).

Up until this point, the Equipment Rentals file includes only the default accounts and privilege sets. In this task you will create a new account and a new privilege set for technicians. The requirements state that technicians will need to be able to edit all Asset data but only view Customer data. They should not be able to delete records in any table. The technicians will not be doing any layout design or scripting. They will also need remote access to the file since it will be hosted on a server.

Activity 18.2: Creating Accounts and Privilege Sets

1. Open the **Manage Security** dialog by choosing **File > Manage > Security....**
2. Enter the Admin account name and password on the dialog that appears and click **OK**.

3. Click **New Account**.
4. For the **Account Name**, type "**Bob**".
5. For the **Password**, click **Change...** and specify "**12345**" as the password. Check the box for **Require password change on next login**.
6. Choose **New Privilege Set...** from the **Privilege Set** drop-down.
7. In the **Edit Privilege Set** dialog that appears, name the privilege set "**Technicians**", shown in Figure 92.

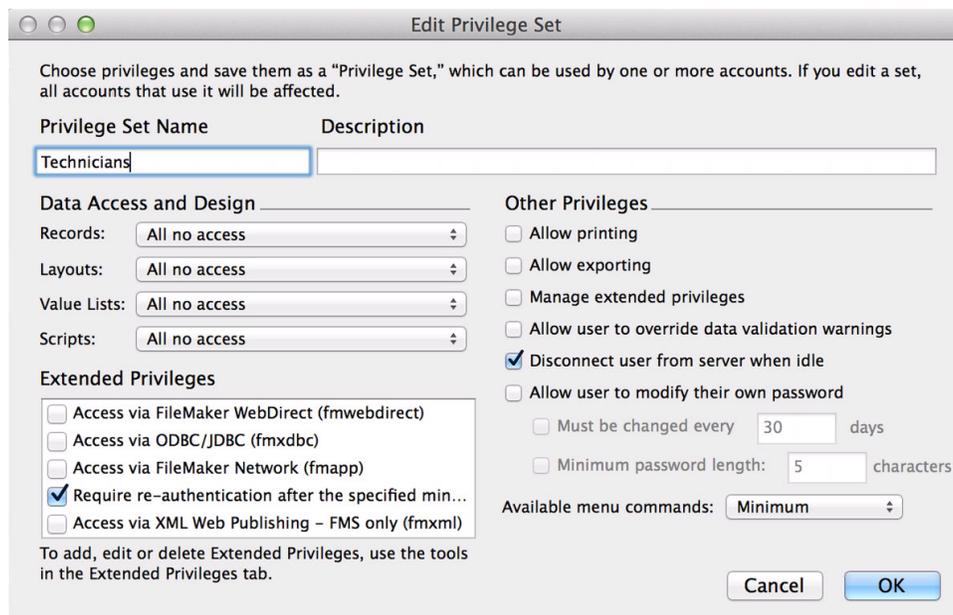


FIGURE 92

8. Choose **Custom Privileges...** in the **Records** drop-down in the Data Access and Design section. This will bring up the **Custom Record Privileges** dialog.
9. Click on the **Assets** table in the list and choose **yes** in both the **View** and **Edit** drop-downs. Choose **no** in both the **Create** and **Delete** drop-downs and choose **all** in the **Field Access** drop-down.

10. Click on the **Customers** table in the list and choose **yes** in the **View** drop-down and choose **no** in the **Edit**, **Create**, and **Delete** drop-downs. Choose **all** in the **Field Access** drop-down. Click **OK**.
11. Specify the following for the remaining **Data Access and Design** options:
 - Layouts: All view only
 - Value Lists: All view only
 - Scripts: All executable only
12. In the **Other Privileges** area, check the boxes for **Allow printing**, **Allow exporting**, and **Allow user to modify their own password**. Choose **All** in the **Available menu commands** drop-down.
13. To turn on access to this file when hosted via peer-to-peer or FileMaker Server, in the **Extended Privileges** section, check the box next to **Access via FileMaker Network (fmapp)**. The Privilege Set should look the same as Figure 93.

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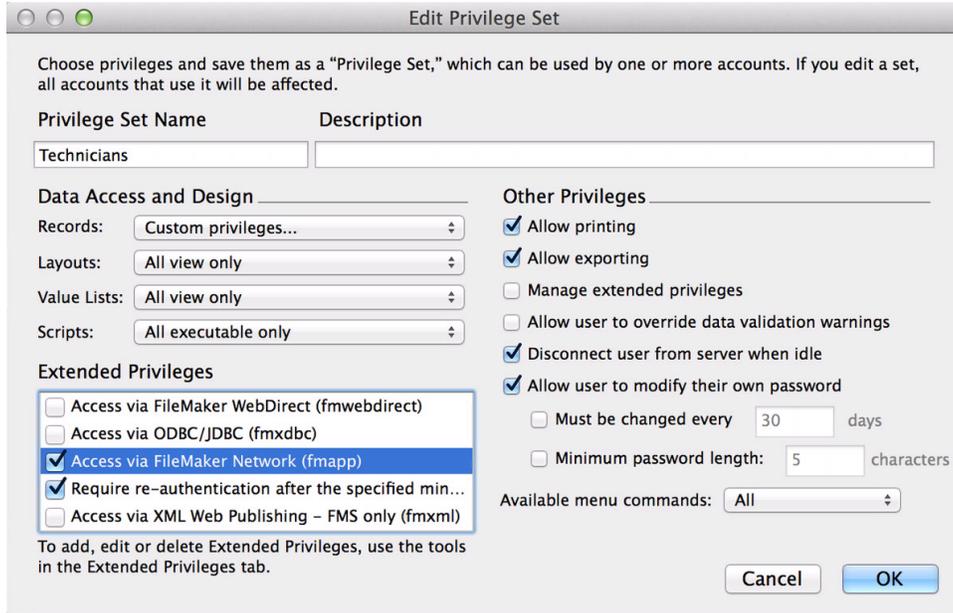


FIGURE 93

14. Click **OK**. The **Manage Security** dialog should now look like Figure 94.

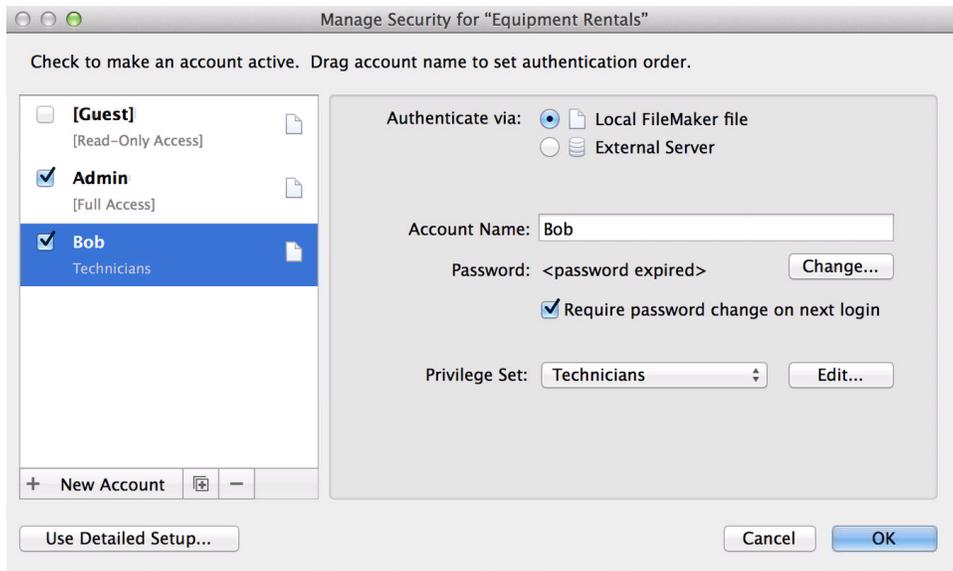


FIGURE 94

15. Click **OK** to close the **Manage Security** dialog.

To test the newly created **Technicians** privilege set, close the Equipment Rentals file, reopen the file, and login with the account **Bob**. You will be prompted to change the password on the account. Change the password to anything you would like. Once logged in as **Bob**, verify that you cannot create or delete records and that you cannot modify layouts or scripts. Also verify that you cannot edit Customer records but can edit Asset records.

Note: To allow you to open the file, the completed final file does not have a password for the Admin account.

By implementing accounts and privileges in your FileMaker solutions, you are securing your data. For Equipment Providers, Inc., the solution will limit access properly for Technicians. Other privilege sets could be added to provide other classes of users with tailored security measures. While security is not a requirement, it is highly recommended in all solutions. Now that your FileMaker solution fulfills the needs of Equipment Providers, Inc., the next lesson will focus on deploying your solution.

Lesson 18: Review Questions

1. What is the difference between an account and a privilege set, and how are they related to one another?
2. If you open a file using FileMaker Go and are not prompted for a username and password, what can you conclude?
3. How many privilege sets can be associated with one account?

Lesson 18: Review Answers

1. The difference between an account and a privilege set is that an account controls your ability to open a file, while a privilege set governs what you can see and do in the file.
2. If you are not prompted for a password, you can conclude that there is a default login enabled.
3. Every account, whether authenticated internally or externally, must be associated with one and only one privilege set.

Lesson 19

Deployment



Lesson 19: Deployment

Lesson Overview

Time

This lesson takes approximately 20 minutes to complete.

Lesson File

Equipment Rentals.fmp12

Objectives

After this lesson, you will be able to:

- Describe the differences between peer-to-peer and FileMaker Server hosting.
- Open files on FileMaker Pro and FileMaker Go.
- Transfer local files to FileMaker Go.

The term *deployment* refers to the various means by which FileMaker developers make solutions available for use by clients. The term also encompasses the standard practices and procedures by which a FileMaker database system is maintained and kept running.

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From FileMaker Server to peer-to-peer sharing to local access, there are many ways to deploy a solution to multiple users. This lesson reviews the deployment options available for FileMaker solutions, discussing the specific advantages of each method and when it might serve you best.

FileMaker solutions can be shared in 3 different ways:

- A solution can be opened on your device as a standalone file. The file will normally be saved locally on the device accessing the file.
- A solution can be hosted for groups of five or fewer by FileMaker Pro for access by FileMaker Pro and FileMaker Go users.
- A solution can be hosted by FileMaker Server for larger groups for access by FileMaker Pro, FileMaker Go, and web browser users. In this case, concurrent connections will be needed to allow access by FileMaker Go and web browser users.

In this lesson, you will learn about these methods of deployment.

LESSON 19

Section 1: Network Sharing

While a FileMaker solution can be used by a single user who opens it locally on their computer or iOS device, one of the FileMaker Platform's most valuable features is its ability to allow multiple users to access a solution simultaneously. There are two ways that a FileMaker solution can be shared by multiple users.

Using FileMaker Pro

FileMaker Pro (or Pro Advanced) can host a solution for as many as five users running either FileMaker Pro or FileMaker Go. Peer-to-peer sharing is appropriate when a small group of users needs occasional access to files.

There are two steps required to set up peer-to-peer file sharing. First, open the file to be shared in FileMaker Pro and enable network file sharing. Then, add the network access extended privilege to one or more privilege sets. You can use the **FileMaker Network Settings** dialog shown in Figure 95 to complete both steps. To access it, choose **File > Sharing > Share with FileMaker Clients...**

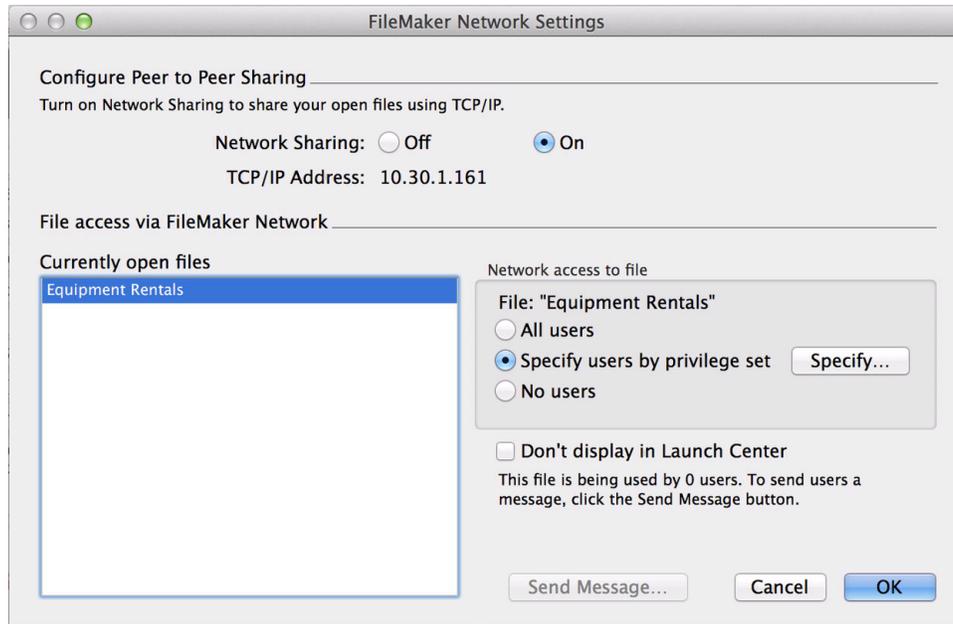


FIGURE 95

After Network Sharing is enabled, the IP address of your machine will be displayed. Users, or "guests", can use this address to connect to the hosted file. Select the files you want to share from the **Currently open files** list, and then specify which groups should have network access to the file.

Once the above steps are complete — as long as the file remains open on the host machine — a user will be able to make a remote connection to the locally hosted file. Details on connecting to a hosted file can be found in the next section.

Using FileMaker Server

FileMaker Server is a dedicated product for sharing and maintaining hosted database files. FileMaker Server provides many benefits over peer-to-peer sharing, including backup and script schedules, SSL encryption, and better

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shared performance. You use the **FileMaker Server Admin Console**, shown in Figure 96, to configure and manage FileMaker Server via a web browser. The console allows you to manage server settings, backup and script schedules, monitor server usage, and download database files from a remote connection.

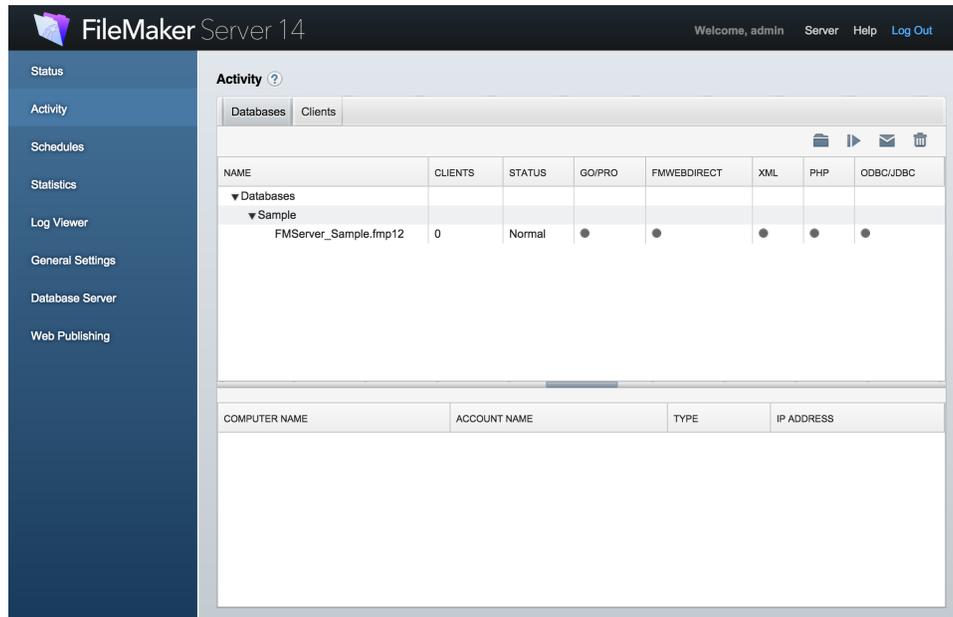


FIGURE 96

The latest hardware requirements for FileMaker Server can be found at the FileMaker Server Technical Specifications page:

<http://www.filemaker.com/products/filemaker-server/server-14-specifications.html>

LESSON 19

Section 2: Opening FileMaker Files

Opening Local Files

Databases that are stored locally on your computer or iOS device can be opened directly using FileMaker Pro or FileMaker Go.

In FileMaker Pro, choose **File** menu > **Open** or press **Command-O** (OS X) or **Ctrl-O** (Windows). You will then be prompted to locate the file you wish to open.

In FileMaker Go, after opening the app, the **Launch Center** appears. The **Launch Center** provides access to recently used files, files on your device, remote hosts, and FileMaker Go application settings.

To open a local file, tap the filename in the list of files on the **Device** panel.

Transferring Files to an iOS Device

There are four methods to transfer files to FileMaker Go so that you can use the files locally on your device:

- Connecting your device to iTunes through your computer with a USB cable.
- Sending a FileMaker file to your device through email.

- Accessing a file from a website.
- Accessing a file from another application, such as Dropbox or Box.com.

If a file is transferred using any of these methods, the file is copied to the device and will be accessible from the **Files on Device** list within FileMaker Go.

Activity 19.1: Opening a local FileMaker file with FileMaker Go

You will transfer the Equipment Rentals file to an iOS device and test the functionality in FileMaker Go.

1. Connect your iOS device to your computer via USB and open iTunes.
2. In iTunes, select your iOS device and click the **Apps** tab.
3. Below **File Sharing**, choose FileMaker Go from the **Apps** list, then click **Add**.
4. Choose the files to transfer, then click **Add**.
5. Open **FileMaker Go** on your iOS device. Similar to Figure 97, **Equipment Rentals** will appear as a local file. Tap on the file to open it.

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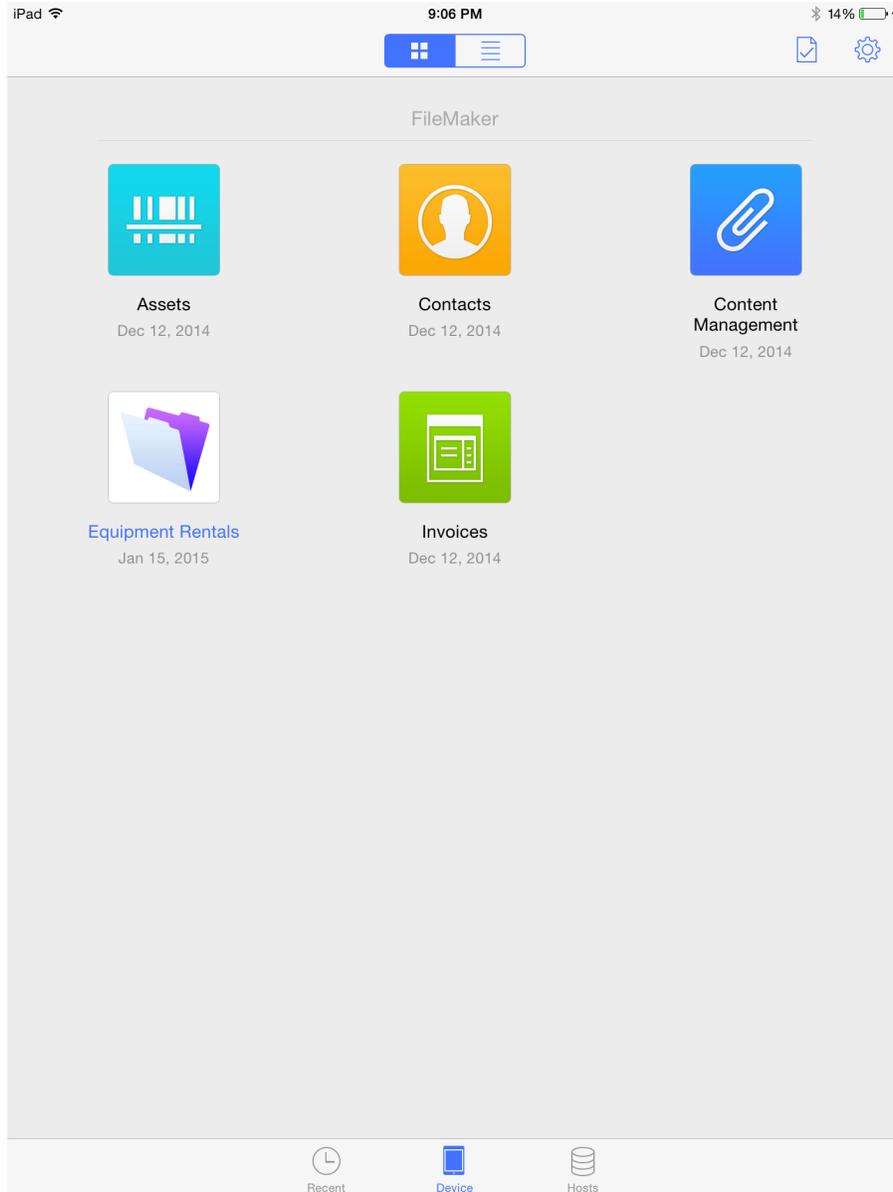


FIGURE 97

Based on the opening script, you will be taken to either the **Asset Details - iPhone** or **Asset Details - iPad** layout, depending on your device.

Note: You can also use one of the other file transfer methods mentioned above.

If a file with the same name already exists, the existing file will not be overwritten. Instead a serial number is added to the file name. For example, if

the file **SomeDatabase.fmp12** already exists on your device and then you receive that file again in an email, the emailed copy of the file is renamed **SomeDatabase 1.fmp12**. The next integer is used for each additional copy of the same file.

FileMaker files copied to an iOS device are accessible by a single user only. This means that data entered in a local database will reside only on that device. With additional development, it is possible for a local file to interact with a hosted file and synchronize data between the two. If your data must be synchronized with other FileMaker files, you will need to create a data sync process by using scripting or a commercial syncing solution.

Opening Hosted Files

Accessing hosted files in FileMaker Go is similar to the way hosted files are opened in FileMaker Pro, including any hosts found on the local network and any hosts saved by manually entering their address. Figures 98 and 99 show the FileMaker Go home screen with the **Hosts** panel selected on iPad and iPhone respectively.

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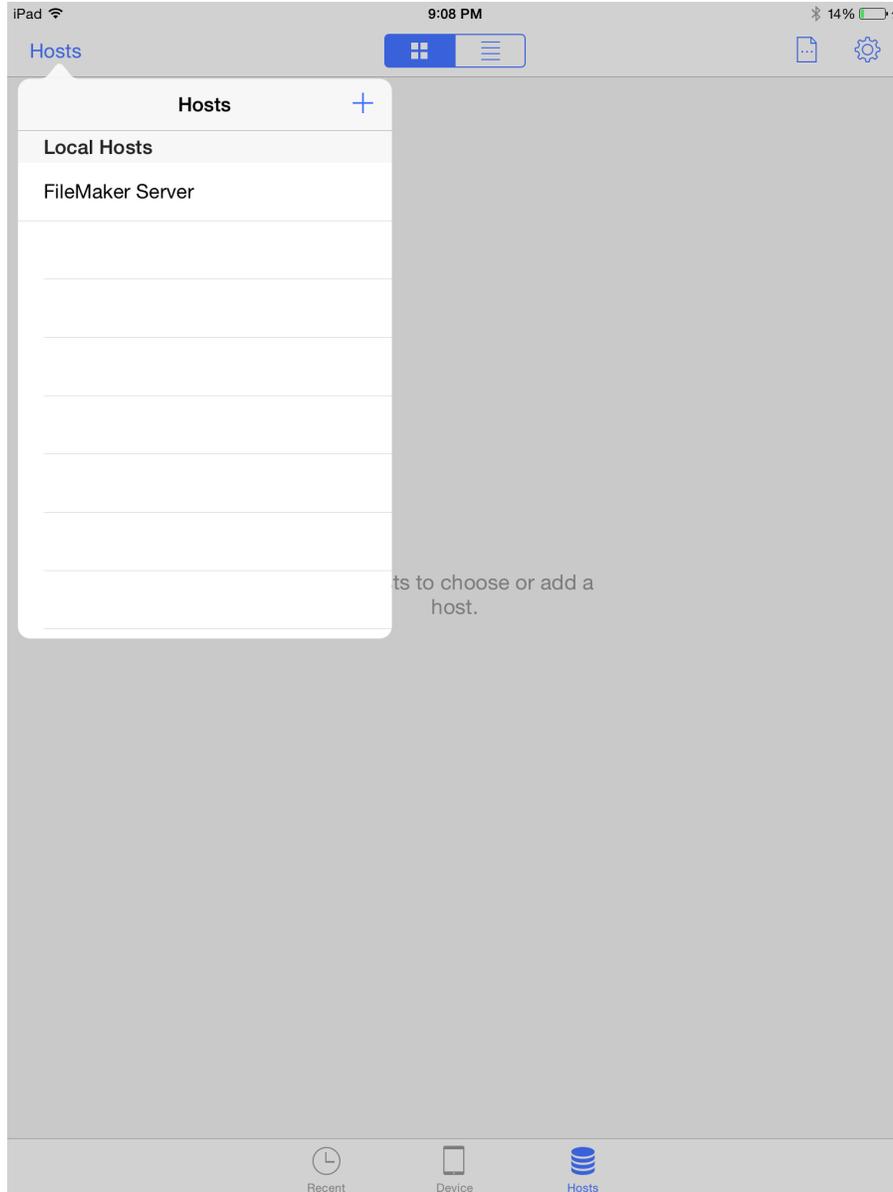


FIGURE 98

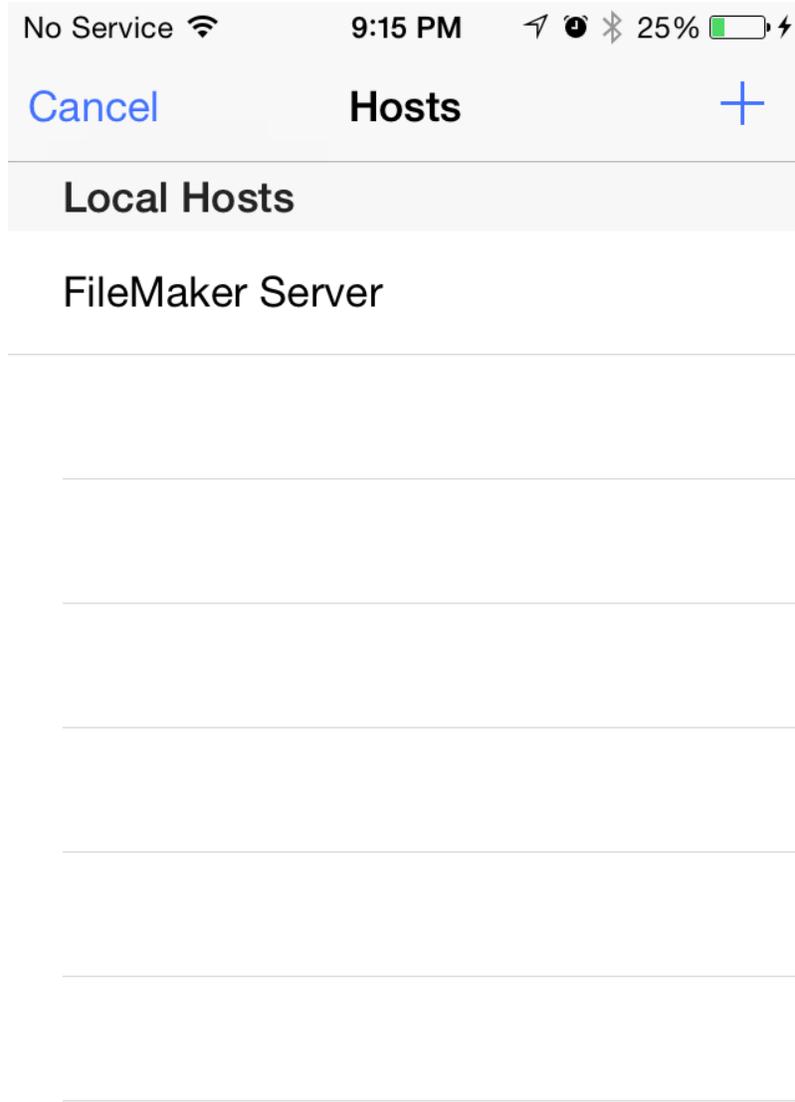


FIGURE 99

To open a file on one of the hosts, tap on **Hosts to see a** list of files available on that host, then tap on a file name to open the file.

Lesson 19: Review Questions

1. What are some benefits to FileMaker Server hosting over peer-to-peer sharing?
2. What are four methods for copying a local file to FileMaker Go?
3. Can a local file interact with a hosted file?

Lesson 19: Review Answers

1. FileMaker Server can share to many more users. It also can protect your data with automatic backups and SSL encryption over the network. Using FileMaker Server also allows for better performance than peer-to-peer sharing does.
2. The four methods for copying a local file to FileMaker Go, are: 1) copying a file to the device by using iTunes, 2) sending the file using email, 3) downloading the file from a website, and/or 4) opening the file in a file-sharing app like Dropbox or Box.com.
3. Yes, local files can interact with hosted files with a combination of file references and scripting.

Conclusion

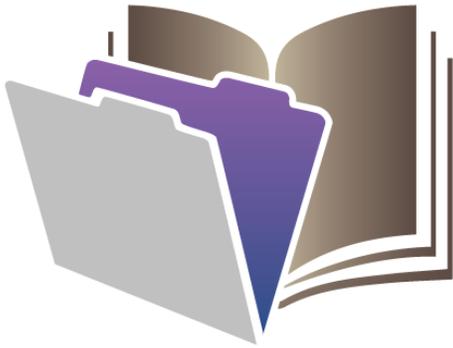


Conclusion

Congratulations! You have successfully built a FileMaker solution that incorporates relationships, layouts, calculations, scripts, reports, and security. More importantly, you have built a solution that addresses the needs of a business.

While the Equipment Rentals solution you just created contains many features, this only scratches the surface of the capabilities of FileMaker Pro. To learn more about all of these features, please proceed to *FileMaker Training Series: Advanced*.

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Acknowledgment

Special credit to Soliant Consulting, Inc. for the development of this curriculum. A platinum partner of the FileMaker Business Alliance, Soliant Consulting specializes in FileMaker Pro development, training, and consulting; the company has offices in Chicago, the San Francisco Bay Area, and Philadelphia.



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