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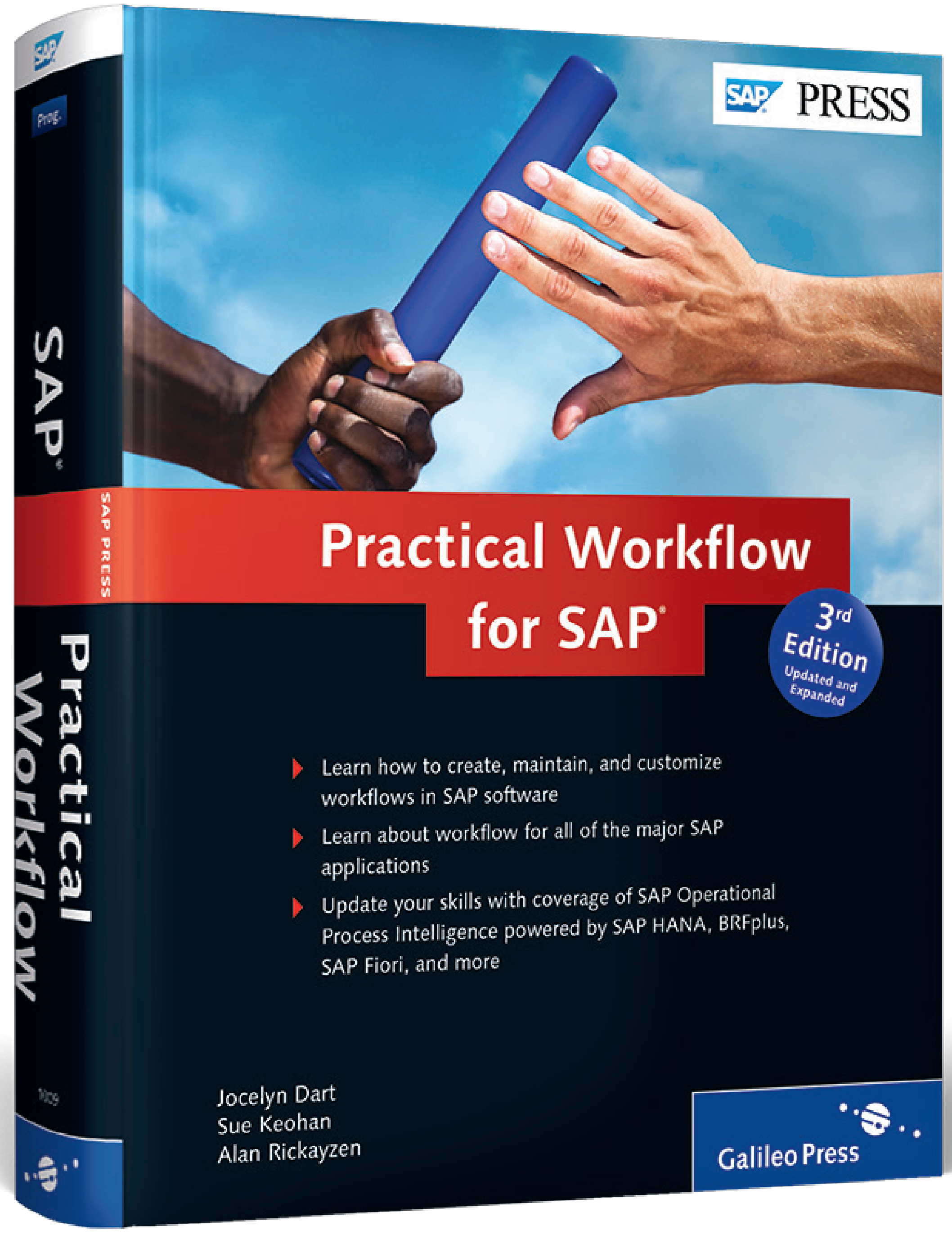
SAP PRESS
Practical Workflow for SAP
3rd Edition Updated and Expanded
Learn how to create, maintain, and customize workflows in SAP software
Learn about workflow for all of the major SAP applications
Update your skills with coverage of SAP Operational Process Intelligence powered by SAP HANA, BRFplus, SAP Fiori, and more
Jocelyn Dart
Sue Keohan
Alan Rickayzen
Galileo Press

Reading Sample

In this reading selection, you'll get a glimpse at the steps you'll need to follow if you have existing workflows in your SAP system, and need to upgrade to a new release. Also, take a brief look at a new chapter in this edition, which discusses how to build a simple workflow application in SAPUI5.

Preface
"Upgrading SAP Business Workflow"
"Using SAPUI5"
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The Authors

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Preface

Welcome to the third edition of *Practical Workflow for SAP*! For those of you who already have experience with SAP Business Workflow, you know that the workflow community really believes in the value of SAP Business Workflow and the real impact it can have on your SAP implementation. The third edition will enable you, the workflow expert and evangelist, to update your workflow skills in SAP NetWeaver with new technical topics such as ABAP classes, user interfaces (UIs), inbox options, SAP Decision Service Management, SAP Fiori, and more. For those of you who are new to workflow, this book is intended for you as well; we hope to have you as an active participant in the workflow community!

Contents of the Book

The first edition of this book was written by SAP workflow experts who are passionate about the topic and about the impact it can have on your business. This third edition of the book stays true to the core goal of providing practical guidance on SAP Business Workflow, but also expands the first and second editions with new capabilities and new ways to use SAP Business Workflow.

This book is divided into five parts:

- **Part I: Getting Started with Workflow in SAP**
  This part of the book starts by introducing SAP Business Workflow, positioning it within the overall SAP Business Process Management (SAP BPM) strategy. It then discusses what you need to know to get SAP Business Workflow running on your system. It discusses how users get tasks from workflow, and the newer ability to use SAP Operational Process Intelligence powered by SAP HANA workflow reporting.
- **Part II: Administering Workflows**
  This part of the book walks you through all of the various tools necessary to administer your workflow environments, including advanced diagnostics, debugging, and guidance when preparing for an upgrade.

Since reporting on workflow-enabled processes has become more and more important over the years, it will also introduce you to using SAP Business Warehouse (SAP BW) for SAP Business Workflow reporting.

- **Part III: Developing Workflows**
  In this part of the book, we get to the heart of developing your workflows, including using the tried-and-true Business Object Repository (BOR) as well as integrating ABAP classes. Use of events and other business interfaces will help you determine how to start and control your workflows. You will learn about service-enabling your workflows so your workflow can cross system and organizational boundaries. You'll learn how to use the BRFplus and SAP Decision Service Management tools to manage complex business rules.
- **Part IV: Enhancing Workflows**
  This part of the book covers various ways to enhance your workflows for newer UIs. It will enable the workflow developer to use Web Dynpro (ABAP or Java) as well as Business Server Pages (BSP) to extend the reach of workflow beyond the traditional SAP GUI. The newest UI technology, SAPUI5, is also covered.
- **Part V: Using SAP Business Workflow in SAP Applications**
  This part of the book covers SAP Business Workflow as used by key SAP Business Suite applications. These include SAP Supplier Relationship Management (SAP SRM), SAP Customer Relationship Management (SAP CRM), SAP ERP Human Capital Management (SAP ERP HCM), and SAP Master Data Governance. You will also be introduced to SAP Fiori, giving your users additional mobility access.

There are also two appendices, which can be referred to for tips and tricks as well as exploring new functionality that has been delivered since the second edition of the book.

With the division of the book into five major parts, you can read the different parts as you need them. Parts I, II, and III are critical for understanding how workflow works. Part IV can be read when you need to integrate one of the discussed UIs with your workflow. For Part V, you can read the chapter that corresponds to the SAP application where you want to use SAP-provided workflows, or you want to know what is unique about workflow on a particular application system.

Target Groups of the Book

This book is intended for business process experts (BPEs) and developers new to the topic of SAP Business Workflow. Although there is some code in this book, the bulk of the "how to build and execute workflows" content requires no programming.

It is also intended for existing workflow experts who are upgrading to SAP NetWeaver 7.0 and above, and need to upgrade their workflow skills. This target group won't need all chapters, but there are new capabilities provided in many chapters (e.g., in the chapters on building workflows and using events), and there are new chapters on SAP Decision Service Management, SAPUI5, and other topics you may not have used on your existing release.

If you're already a workflow expert and are starting a workflow project on SAP SRM, SAP CRM, or SAP ERP HCM, then this book will provide important insight on how to use workflow on these application systems.

Structure of the Book

In detail, the book consists of the following chapters:

- **Chapter 1: Introduction**
  This chapter provides an introduction into SAP Business Workflow by discussing what SAP Business Workflow is, when to use SAP Business Workflow, its major features, and how SAP Business Workflow fits in with the SAP overall strategy for SAP BPM. If you are an existing workflow expert, we still recommend that you read this chapter so you know where workflow fits in the SAP BPM strategy.
- **Chapter 2: Requirements Gathering Strategy**
  Before starting any workflow project, you need to know what is expected when the workflow goes into production. This chapter discusses questions that should be asked before starting a workflow project, how to know if the business problem is a candidate for SAP Business Workflow, and how to measure your results. This chapter is a must read before starting your first workflow project. The content also includes a number of checklists that can be downloaded from the SAP PRESS website (*http://www.sap-press.com/3615*).

- **Chapter 3: Configuring the System**
  Before you can start using workflow, the system must be configured to use SAP Business Workflow. This chapter discusses how to do the initial required configuration.
- **Chapter 4: Work Item Delivery**
  Work item delivery discusses the users' experiences with SAP Business Workflow. This chapter discusses the inboxes that exist and the capabilities of the inboxes, and provides recommendations for delivering work items to users.
- **Chapter 5: Agents**
  When a workflow executes, it's critical that the right person receives the right task. This chapter discusses the role of agents in the design of a workflow.
- **Chapter 6: Setting Up an SAP-Provided SAP ERP Workflow**
  Chapter 6 walks through an example of configuring a workflow template that's provided by SAP in an ERP system.
- **Chapter 7: SAP Operational Process Intelligence Powered by SAP HANA**
  This chapter describes an SAP HANA add-on that has been developed to be used in conjunction with different workflow systems, including SAP Business Workflow. This opens a whole new set of opportunities, breaking many technical boundaries and giving business visibility and control of the underlying workflows.
- **Chapter 8: Workflow Administration**
  The workflow administration chapter provides information on what reports are available with SAP Business Workflow, and discusses how to ensure the workflows and agent assignments are kept updated to meet changing business requirements.
- **Chapter 9: Using SAP Business Warehouse for SAP Business Workflow Reporting**
  This chapter discusses the option to report on workflow execution from SAP BW. This gives the option to provide analytical reports for upper management on how often and how long processes are executing.
- **Chapter 10: Administration Troubleshooting Guide**
  This chapter provides a practical guide to troubleshooting some of the thornier problems that you may run into in the development environment.

- **Chapter 11: Advanced Diagnostics**
  Chapter 11 walks through the commonly used tools that are used to debug and resolve common workflow problems.
- **Chapter 12: Upgrading SAP Business Workflow**
  This chapter is intended to be read as part of preparation when planning an upgrade from SAP R/3 4.6x to SAP NetWeaver 7.0 and above.
- **Chapter 13: Creating a Workflow**
  Chapter 13 provides concrete examples and guidance when creating your very first workflow. It walks you through each part of workflow creation.
- **Chapter 14: Advanced Workflow Design Techniques**
  Advanced workflow design goes beyond the most simple workflow design. This chapter discusses more advanced topics such as parallel processing, containers and bindings, and other topics to enhance your workflow skills.
- **Chapter 15: Business Objects**
  Workflow functionality is based on application functionality. Business objects from the BOR link the workflow to the application functionality. This chapter discusses how objects work and how to create your own business objects.
- **Chapter 16: ABAP Classes**
  ABAP classes can be used instead of or in addition to business objects. Classes link workflow to business functionality. This chapter walks you through creating your own ABAP classes for SAP Business Workflow.
- **Chapter 17: Agent Determination Rules**
  Chapter 5, Agents, discusses how agents work in SAP Business Workflow. This chapter walks through options to determine who should get a specific task at runtime.
- **Chapter 18: Using Events and Other Business Interfaces**
  After a workflow is created, the application must tell the workflow to start and possibly when to stop. This chapter walks through how to get the workflow to respond to what is happening in the application.
- **Chapter 19: Custom Programs**
  This chapter covers the most commonly used Workflow Application Programming Interfaces (WAPIs).
- **Chapter 20: Service-Enabling Workflows**
  After you have a workflow in place, you may need the workflow to be called as a service. This chapter discusses Service-Oriented Architecture (SOA), service-

enabling a workflow, and calling the service via SAP Process Orchestration (SAP PO).

- **Chapter 21: BRFplus and SAP Decision Service Management**
  In this chapter, we'll introduce you to business rules and the framework that supports them (BRFplus), as well as SAP Decision Service Management. Within SAP Business Workflow, you can use these technologies to control thresholds, deadlines, path selection, and much more.
- **Chapter 22: User Interface Options**
  This chapter describes required steps if you want to execute a workflow task using Web Dynpro or Business Server Pages (BSP). This chapter should be read before reading Chapter 23 through Chapter 25.
- **Chapter 23: Using Web Dynpro ABAP**
  Chapter 23 uses the user decision step type available in SAP Business Workflow to discuss using a Web Dynpro ABAP with SAP Business Workflow.
- **Chapter 24: Using Web Dynpro Java**
  This chapter covers the major steps required when using Web Dynpro Java to execute a workflow task.
- **Chapter 25: Using Business Server Pages**
  This chapter walks through an example of executing a BSP as the UI for a workflow step.
- **Chapter 26: Using Forms**
  Chapter 26 discusses the form step type in SAP Business Workflow.
- **Chapter 27: Using SAPUI5**
  You'll take a look at SAPUI5 as it stands in relation to the other UI technologies presented in this book. We'll then walk you through the steps to create a fully working simple workflow application that retrieves tasks from SAP, presents them in a list, allows the display of detailed information, and also gives the user the chance to approve or reject.
- **Chapter 28: ArchiveLink**
  Chapter 28 discusses the use of ArchiveLink for imaging projects with SAP Business Workflow.
- **Chapter 29: SAP Supplier Relationship Management**
  This chapter discusses how workflow is used in SAP SRM 7.0 and SAP SRM 5.0. It describes the workflow frameworks and provides examples of usage.

- **Chapter 30: SAP Customer Relationship Management**
  This chapter discusses how workflow is used in SAP CRM 7.0. It describes the SAP CRM frameworks, including the SAP CRM UI, and how workflow works in SAP CRM.
- **Chapter 31: SAP ERP Human Capital Management—Process and Forms**
  This chapter covers the major use cases for workflow in SAP ERP HCM administrative services and provides a business and technical overview of form usage.
- **Chapter 32: SAP Governance, Risk, and Compliance**
  GRC products all rely on the standard SAP Business Workflow, although some additional features are worth mentioning. In this chapter, we'll examine GRC workflow more for where it varies from or builds upon the SAP Business Workflow standard.
- **Chapter 33: SAP Fiori and Mobility**
  In this chapter, we'll briefly look at key issues to consider when considering mobile workflow.
- **Chapter 34: SAP Master Data Governance**
  In this chapter, we'll quickly overview the SAP Master Data Governance application and the change request process, and then discuss the different ways you can use and implement SAP Business Workflow and rule-based (RBWF) to make changes to the process.
- **Appendices**
  Appendix A covers common tips and tricks. **Appendix B** gives information about new features and functionality. In addition to the appendices, there are also ready-to-use checklists for your first workflow project you can download from the SAP PRESS website (*www.sap-press.com/3615*), as well as downloads of the code used throughout the book.

System Requirements

Although many sections of the book are release independent, the content is based on workflow capabilities available in SAP NetWeaver 7.4. When discussing SAP applications, the SAP Business Suite is generally assumed. Specifically, SAP ERP (ECC 6.0), SAP SRM 7.0, and SAP CRM 2007/7.0 are the releases that are used in the application-focused chapters.

Further Training

If you want more information on workflow after reading this book, SAP Educational offers classes on SAP Business Workflow. BIT600 is an introduction class, BIT601 is a class on building workflow, and BIT610 is a class on development with SAP Business Workflow. For further information, visit the SAP Education website at *http://www.sap.com/services/education*.

Acknowledgments

This book could not be possible without the incredible efforts from the authors of the first edition. Alan Rickayzen, Jocelyn Dart, Carsten Brennecke, and Markus Schneider provided a very successful first edition that has been widely used and is greatly appreciated by the workflow community.

Ginger Gatling accepted the challenge to update that original "Workflow Bible" in 2009, and assembled 14 authors from around the world to donate their time and energy. These authors included additional workflow developers, consultants, partners, and customers. Ginger's efforts cannot be overestimated. She worked with each author on their specific chapters and ensured the whole lot hung together cohesively.

Each and every author of this edition accepted and rose to unique challenges. Whether trying newer tricks in ABAP classes, reviewing more mature technologies for updates, or forging ahead with shiny new stuff, they all brought their A game. I am so fortunate to have had some association with so many bright and dedicated people.

When we started this book project, we all knew it would take time and considerable effort, but the time taken from family was certainly underestimated. We are all very fortunate in life if we can find people who love us, and when those people encourage us and support us during times when work takes front and center, as it did while working on this book, we realize how fortunate we are! So, thank you to our families and friends who provided support, encouragement, and patience throughout this project.

As a final note, I hope you have noticed that all royalties from this book will be donated to Doctors Without Borders/*Médecins Sans Frontières*. I remember early conversation with Ginger about what to do about author royalties for the second edition—how could you *even begin* to calculate one author's updates to an existing

chapter written by a previous author, versus someone writing an entirely new chapter? Well, you couldn't. So in addition to her cat-herding skills, Ginger was also instrumental in getting the proceeds from the second edition donated to a cause that the SAP Community has supported in various ways over the years—Doctors Without Borders/*Médecins Sans Frontières*. At the time of this writing, the second edition had raised roughly $35,000 to support Doctors Without Borders.

Each author has individually decided to donate his or her royalties. Your purchase of this book helps us support an international medical humanitarian organization that delivers emergency aid in many countries. Thank you for enabling us to provide support to this important organization.

I hope to see you blogging about workflow on SCN after reading this book!

Susan Keohan
SAP Community Network member

Upgrade projects include workflow upgrades, even if the workflow is limited to a technical-only upgrade. This chapter provides recommendations for when you're planning and executing an upgrade.

12 Upgrading SAP Business Workflow

By Eddie Morris

If this is the first chapter you're reading in this book, then you probably have several existing workflows in your production system, are planning an upgrade, and are wondering how the journey will go. This chapter gets your journey started through a discussion of recommended steps to take before your upgrade begins, steps you should take during the upgrade, and what to do after the upgrade completes.

The workflow upgrade will be successful if it has a complete project plan, including a thorough understanding of your existing workflows, setting user expectations for what will happen before and after the upgrade, creating workflow test plans, executing a proof of concept, and performing significant testing. This chapter will explain how to get this all in place.

12.1 First Steps to Upgrading Workflow

Assessing, learning, and planning should be the very first thoughts you have when considering an upgrade and the impact to your existing workflows. Consider the following points:

- **Your upgrade planning should begin with an inventory of your existing workflows.**
  You should be able to answer the following questions:
  - How many workflows do you have in production?
  - How often do they execute?

    - How many instances of workflow are in error?
    - What custom business objects have you created?
    - How many custom attributes and methods have you created in a business object?
    - Have you done any modifications to existing objects or other workflow functions?
    - Have you created custom copies of SAP-provided workflow templates and customized these copies?
- **Plan to perform a proof of concept on the upgrade.**
  Your full upgrade project will probably include a mock upgrade or proof of concept upgrade on a copy of your production system. Ensure workflow is included in this effort.

  Workflow testing should be performed on the most critical workflow processes. This enables you to define realistic timelines and user expectations for the project.
- **Consider an archiving strategy before your upgrade project.**
  If your existing system has been around for many years, you may have completed work items from many years ago. Archiving these work items reduces the amount of time and effort that's involved in the upgrade.
- **Leverage other customers who have already completed an upgrade.**
  Your region should have a local SAP user community. Be sure to network with your regional SAP user community to find customers who have already performed their workflow upgrade. Some user groups may have a special interest group that's focused on workflow. Networking with other customers who have completed an upgrade is usually very insightful.
- **Familiarize yourself with new workflow features.**
  Make you leverage what SAP delivers to the fullest extent. There is no need to create a custom feature when the feature is already provided by SAP. Doing your homework on the new workflow features can save development time.

  By reading the other chapters in this book, you've started learning these new features. For the upgrade preparation, be sure to read Chapter 14, Advanced Workflow Design Techniques. This chapter covers new container and binding features that you need to understand when testing your workflows after the upgrade.

12.2 Steps to Take Before the Upgrade Begins

Planning, planning, and more planning are critical to your workflow upgrade. The following steps outline what should be done *before* the upgrade begins. Some steps can be started at the beginning of your planning process. For many of the steps, the earlier they start, the better.

12.2.1 Complete All Running Workflow Instances (Where Possible)

Maybe you can't complete all the workflow instances, but at least complete all of the ones you can *reasonably* complete. Completing all running workflow instances is much easier to recommend than to actually do. Many of the customer issues appearing after an upgrade are due to existing work items in the users' inboxes. You should perform an evaluation to know which workflows you can reasonably complete.

Be sure to complete as many workflow instances as you possibly can. If you have long-running workflows (for example, training workflows that could take months to complete), you won't be able to complete all instances. But you should look at each workflow individually and determine which ones can and should be completed before the upgrade begins. Many short-lived approval and Electronic Data Interchange (EDI) workflows should be completed before the upgrade.

12.2.2 Create Workflow Test Plans

Your existing workflows must be fully tested. The test plans should include full executions of each workflow you have in production:

- For the critical workflows, make sure that you test each process scenario within the workflow (test each branch).
- For workflows that must be "in progress" when the upgrade happens, make sure that examples of each workflow in progress are included in your test plan.

After the upgrade completes, there should be no surprises when executing a work item that was in a READY status before the upgrade began.

12.2.3 WF and T Tasks versus WS and TS Tasks

Depending on the release that you're upgrading from, you may have created `WF` and `T` tasks when creating your own workflows. If you're upgrading from a release where `WF` and `T` tasks were used, you should know that SAP recommends all workflows be based on `WS` and `TS` tasks. `WS` and `TS` tasks types are client-independent objects and recommended by SAP for all custom workflow development.

You aren't required to convert your `WF` and `T` tasks to `WS` and `TS` tasks; it's recommended you do copy the `T` to `TS` and `WF` to `WS`. However, this does not have to be done before the upgrade; it can be done over time after the upgrade.

12.2.4 Clean Runtime Tables

Cleaning the runtime tables is one of the most important things you can do to help with the speed of the upgrade, as well as to ease debugging after the workflow upgrade completes. Removing the workflow runtime tables of all unnecessary data enables the upgrade to run faster. The best option is to *archive* as much workflow runtime data as possible according to SAP Note 573656.

Whenever the word *archiving* comes up, the conversation normally gets very quiet. Many customers prefer not to archive anything. The tricky part about archiving workflow is that workflow items are normally considered one part of a total archiving project. For example, if you have SAP Supplier Relationship Management (SAP SRM) shopping basket approvals, the archiving strategy could dictate that you archive the entire shopping cart and the related purchasing documents. If your company has an archiving strategy, be sure that workflow is included. If not, work with your business stakeholders on a possible archiving project for your old work items.

There might also be runtime data that you simply don't need any longer; for example, workflow that's related to EDI processing, or other work items where the workflow isn't subject to a business or system audit. If you have runtime data that isn't needed in the future, consider deleting this data via Report RSWWWIDE (see SAP Note 49545). Be aware that once deleted, the data is no longer available. Various workflow database tables may contain unnecessary entries after you delete the work items. Therefore, it's also a good idea to run Report RSWWWIDE_DEP and Report RSWW_REORG_SWWUSERWI to remove these

unnecessary entries. See SAP Note 1427068 for more information on Report RSWW_REORG_SWWUSERWI.

SAP Note 1068627 covers all of the notes you should use when upgrading to SAP NetWeaver Application Server 6.40 or 7.0. Ensure that *all notes* listed are applied to your system. Also ensure that you review *any recommendations* contained in the notes.

12.3 Steps to Take During and After the Upgrade

This section discusses the steps you should take during and after an upgrade.

12.3.1 Conversion of Event Linkage Tables

In release SAP R/3 4.6C, the instance linkage for workflow steps was stored in Table SWEINSTCOU. Beginning with release 4.7 (Basis 6.20) and onward, this information is stored in Table SWFDEVINST. During the upgrade, Report RSWFEVTXPRA moves the entries from the old table into the new table. This conversion can take a very long time. However, if you can delete and archive existing work items, the event linkage tables will be cleaned up as well.

12.3.2 Basis Support Package

After the workflow upgrade, you should apply the latest Basis support package. The latest support package has all current fixes, and it's important that you immediately upgrade to the latest support package.

12.3.3 Configure Your System for Workflow

On completion of the workflow upgrade, it's important that you configure the upgrade system by calling up workflow Customizing (Transaction SWU3). You have to define the workflow administrator to configure the RFC destination and schedule the workflow batch jobs. You may choose to PERFORM AUTOMATIC WORKFLOW CUSTOMIZING or execute all activities manually with the EXECUTE button.

For more details on configuring, refer to Chapter 3, Configuring the System.

Recommendation

Don't run Perform Automatic Workflow Customizing for section Classify Tasks as General, because this may lead to previously unassigned work items being sent to all users' inboxes. See Knowledge Base Article 1504215 for further information in the Support Portal.

12.3.4 Workflow Definition and Binding

After you perform your upgrade, you may have issues in your workflow definition and in the binding. SAP Note 1060762 discusses container operations with date fields and time fields, providing guidance on container operations that may need to be adjusted. You might also have ABAP Data Dictionary objects in your workflow container that are no longer valid after the upgrade. This is covered in SAP Note 1058159.

Binding checks are stricter as of SAP NetWeaver 7.0. Binding definitions that did not error or cause problems may result in binding errors. Your workflow template containers may refer to ABAP Data Dictionary data types that no longer exist in the upgraded system. SAP Note 939489 covers the issue and recommends that you re-create the missing type ABAP Dictionary element. If this isn't possible, the note also provides a program that you can execute to resolve the problem.

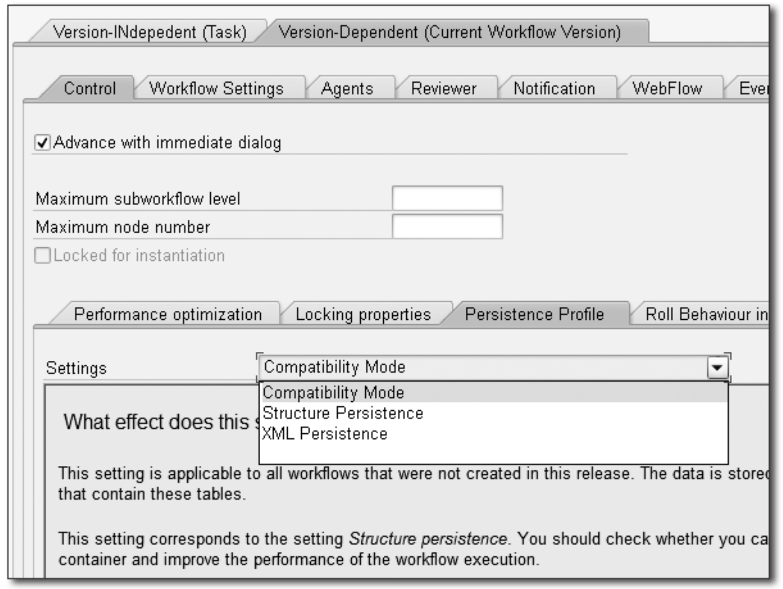
With release 7.10, the data binding mechanism has become even stricter. After the upgrade, running instances may suddenly go into error due to the more severe data flow inspection at runtime. See SAP Note 1787443, because after it's applied, it makes the data binding more fault tolerant again. With the corresponding support packs of SAP Note 1787443, you can switch the binding runtime checks on or off via Transaction SWPA. See Knowledge Base Article 1732734 for more information.

12.3.5 Tables SWW_CONTOB and SWW_CONT

One major change from release SAP R/3 4.7 is persistence of the workflow container. This is discussed in Chapter 14, Advanced Workflow Design Techniques. The change is the use of XML persistence. Tables SWW_CONTOB and SWW_CONT only continue to be used if you choose the "old" container persistence.

When using XML persistence in your workflow, no entries are written to these tables. You can change the settings for the persistence profile of a workflow. In the Workflow Builder, select Goto • Basic Data • Version Dependent • Control. Look in the Persistence profile tab to change the settings.

Figure 12.1 shows the persistence options for the workflow container. XML Persistence is the new entry. The other options continue to use Tables SWW_CONTOB and SWW_CONT for container persistence.



[✓] Advance with immediate dialog

Maximum subworkflow level

Maximum node number

[ ] Locked for instantiation

Settings: Compatibility Mode

What effect does this s

This setting is applicable to all workflows that were not created in this release. The data is stored
that contain these tables.

This setting corresponds to the setting *Structure persistence*. You should check whether you ca
container and improve the performance of the workflow execution.

Figure 12.1 Persistence Profile for Container Storage

Entries with XML persistence are stored in Table SWWCNTP0. The only issue you'll have with the XML persistence is custom code that reads from Tables SWW_CONTOB and SWW_CONT.

Recommendation

Don't change the persistence profile for existing workflows. Use the XML persistence for new workflows that are created after the upgrade.

12.3.6 Changed Locking Behavior of Runtime

The locking behavior at runtime has been changed in SAP NetWeaver 7.0 for synchronous dialog chain steps. The change was made to improve throughput.

Figure 12.2 shows the difference between the old and new locking mechanisms. In previous releases, when each step executed in a dialog synchronous chain, the work item ID was locked when the step was executing. The lock was enqueued when the step started, and dequeued when the stop completed. After the first step completed, then the parent work item ID (work item ID for the WS template) was locked. The parent ID was dequeued when the next step in the chain began. Throughout the three steps, either the parent work item ID or the `TS` task ID was locked. For each lock acquired and released, the lock had to be enqueued and dequeued.

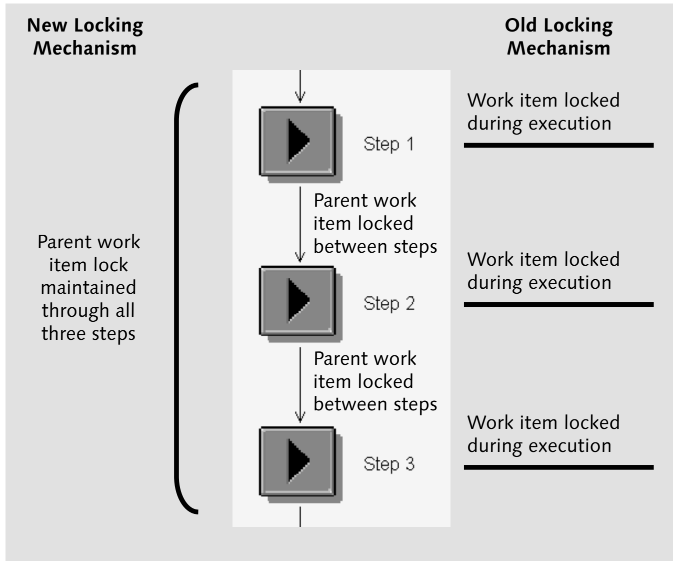

New Locking Mechanism
Old Locking Mechanism
Parent work item lock maintained through all three steps
Step 1
Work item locked during execution
Parent work item locked between steps
Step 2
Work item locked during execution
Parent work item locked between steps
Step 3
Work item locked during execution

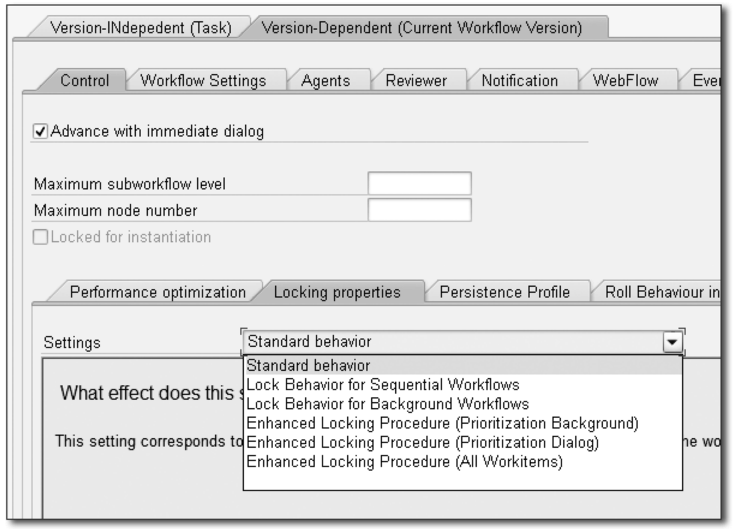
Figure 12.2 Locking Behavior for Synchronous Dialog Chains

For customers who have very high volume and require more throughput, the design was changed so that the parent work item ID is locked throughout the entire synchronous dialog chain.

Locking throughout the entire dialog chain results in faster throughput and fewer system resources consumed. However, when a workflow executes with parallel steps, sometimes the new locking can lead to locking conflicts. When this occurs,

the workflow stops until the next scheduled run of the job `SWWERRE` to fix workflow errors.

You have the option to configure the use of the standard locking or the new locking. You configure it in the workflow definition via the menu path GoTo • Basic Data • Version Dependent • Control. Then select the Locking properties tab. The options are shown in Figure 12.3.



[✓] Advance with immediate dialog
Maximum subworkflow level
Maximum node number
[ ] Locked for instantiation

Settings: Standard behavior
Standard behavior
Lock Behavior for Sequential Workflows
Lock Behavior for Background Workflows
Enhanced Locking Procedure (Prioritization Background)
Enhanced Locking Procedure (Prioritization Dialog)
Enhanced Locking Procedure (All Workitems)

What effect does this s
This setting corresponds to

Figure 12.3 Locking Properties for a Workflow Definition

The recommendation is to use the standard behavior, which is the old locking, or the Enhanced Locking Procedure (All Workitems).

Recommendation

Use the standard locking unless you have a specific throughput situation where you need the enhanced locking. If enhanced locking is required, use the Enhanced Locking Procedure (All Workitems) option. Refer to SAP Note 1122756 for more details.

12.3.7 Other Issues after the Upgrade

After the upgrade completes, you need to consider a few other issues:

- If you stay with the SAP GUI, you need to upgrade to the latest SAP GUI release and patch level.

- After the upgrade, some users find that they can no longer display the object method by clicking the link in the preview pane of Transaction SBWP (the transaction for the inbox). This also may affect the users' ability to view work item attachments or secondary methods. This is due to missing authorization of Transaction SWO_ASYNC, which is detailed in SAP Note 1006235 and Knowledge Base Article 1840681.
- After the upgrade completes, there might be issues with deadlines, hanging workflows, and transports that were in progress before the upgrade began. Notes to assist in resolving upgrade issues are shown in Table 12.1 in the following section.
- After the upgrade, you might find that some objects don't work as normal. The solution for this is to generate the object and any subtypes that are associated with the object via Transaction SWO1.

12.4 Important SAP Notes

Table 12.1 lists important SAP Notes when it comes to upgrading.

SAP Note	Topic
Preparing for the upgrade	
1068627	Composite workflow upgrade note
573656	Collective note for archiving work items
Event linkages	
1019080, 808790	Performance during upgrade
Workflow definition and binding, conditions	
1060762	Container operation with date fields and time fields
1058159, 939489	Missing elements in the workflow container
1228836	Compatibility of conditions with date/time constants
1787443, 1732734	Stricter binding from Basis release 7.10
Security access for Transaction SWO_ASYNC	
1006235	Authorization check for Transaction SWO_ASYNC
1840681	Error in asynchronous method start
Deadlines, transport, and hanging workflow notes	
1092157, 1025249	Deadlines
215753	Old workflows hanging
571302	Collective note for workflow transport issues

Table 12.1 Important SAP Notes

Table 12.1 Important SAP Notes (Cont.)

This chapter provides an introduction to SAPUI5, which is a UI technology with a different pattern from many of the other technologies in this part of the book. We'll build a simple workflow application while paying particular attention to some of the SAPUI5 features that are used in the application's construction.

27 Using SAPUI5

By DJ Adams

SAPUI5 is a toolkit that has been constructed to enable *outside-in* applications to be developed. It contains a wide selection of tools in the form of libraries, user interface (UI) controls, data management mechanisms, module management, internationalization, and more. The runtime for these outside-in applications is the web browser—more specifically, modern web browsers that support a collection of standards and technologies (predominantly HTML, Cascading Style Sheets [CSS], and JavaScript) collectively known as HTML5. The SAPUI5 toolkit contains everything you need to build modern, interactive, responsive, and platform-independent web-based applications, as described in the following list:

- **Modern**
  The UIs of SAPUI5-powered applications have a modem look and feel and can stand shoulder to shoulder with other "consumer grade" applications that have a user experience we've come to expect from applications used outside the enterprise context.
- **Interactive**
  The web browser is the most widespread, and arguably the most powerful and capable virtual machine (VM) for today's applications. With this power comes a flexibility not seen before on such a universal and generic scale, and when combined with the outside-in approach to application development, fine detail interactions aren't only possible, but become the norm.
- **Responsive**
  This is a subject large enough for its own book, but suffice it to say that today's

consumer and business requirements often include the desire to interact with an application independent of device. There are libraries within SAPUI5 that are specifically designed to support writing an application once and having it run well on desktops, tablets, and smartphones.

- **Platform independent**
  With the majority of web browsers (and, more importantly, layout and rendering engines such as WebKit) holding no allegiance to any particular operating system, applications written natively for the web are by definition platform independent.

In this chapter, we'll first take a look at SAPUI5 as it stands in relation to the other UI technologies already presented in this part of the book, to understand what it is, how it stands apart, and where it's employed. We'll then walk you through the steps to create a fully working simple workflow application that retrieves tasks from SAP, presents them in a list, allows the display of detailed information, and also gives the user the chance to approve or reject. The last section presents some pointers for further features and information.

Note

For more information on SAPUI5, see the book *Getting Started with SAPUI5* by Miroslav Antolovic (SAP PRESS, 2014).

27.1 UI Applications

In this section, we'll help you get an understanding of how SAPUI5 compares to other UI applications. The inside-out pattern refers to an approach that is taken with building applications that have a user-facing aspect. Essentially, the UI is built "inside" the system and pushed out to the user. Server-side technologies are used to define the components of what the user sees, and that definition is then pushed out to the user in a mostly static form. Minimal business and control logic exist outside the server.

But there's another pattern to consider, which is "outside-in." Here, we see the most extreme version of client-server application programming. The application logic, at least the logic that drives the transition between different aspects of the

application's functionality (as well as the logic that handles user interaction, data formatting, dynamic presentation of UI elements, and more) is built outside of the server context and directly for the client, where it runs independently of the server. The interaction with a server (say, an ABAP stack) is via discrete HTTP calls to retrieve and manipulate business data and execute backend business logic. Although not entirely independent of the server, an outside-in client application can be seen as an entity in its own right; indeed, with the appropriate client-side mock data services in place, it can be developed and tested completely in isolation from the server.

27.2 Inside SAPUI5

Now that we've been introduced to SAPUI5, let's take a look at its major component parts, with a particular focus on what is required to build our simple workflow application. We'll cover various libraries, and pick one in particular that will help us create an application that has a responsive design. We'll also look at how we interact with the server, as well as examine features of SAPUI5 that support nontrivial application design, such as the Model View Controller (MVC) concept and component-based code organization.

27.2.1 The Libraries

The libraries are collections of features, predominantly UI controls, which can be used to construct the UI of your application. There are many libraries, far too many to cover in this chapter, but we'll cover a few important ones.

Perhaps the most important library for building modern multiplatform applications is the `sap.m` library, which contains a wealth of visible UI elements. As the `m` part of the library name intimates, it was designed for mobile first, so the controls are responsive from the ground up.

A great showcase of `sap.m` controls is the `sap.m` Explored application that's available in the SAPUI5 SDK, itself written using `sap.m` controls. A coffee break or two getting to know this Explored application and what it showcases will be time very well spent. Note that the source code is available for all the `sap.m` samples presented in the Explored application—just select the appropriate button to see it.

27.2.2 Model View Controller

The Model View Controller (MVC) concept has been around for a very long time. It allows a developer, or a team of developers, to separate out the different concerns of an application (presentation of visible elements, handling of logic, and integration to the data sources) so that each concern can be independently built and maintained.

At its core, SAPUI5 supports the MVC concept and makes it easy to build applications with loosely coupled models, views, and controllers. It's not opinionated, nor does it dictate any particular pattern. Rather, it makes the construction of MVC applications an accessible and first-class approach to development.

There are a couple of aspects of the MVC support that are of particular interest for us: the model support for various data sources, and the array of possibilities when it comes to defining views.

Model Support

SAP's MVC implementation includes support for different data source types: arbitrary XML, JavaScript Object Notation (JSON), and OData. Support can be either with one-way binding (from the model to the view) or two-way (from the model to the view, and vice versa). The OData model support is of particular interest to us for our simple workflow application, because it allows us to reach back to the server and enjoy read/write access to SAP's workflow system. In our case, the server is an ABAP stack with SAP Gateway components, although it could be any SAP system that speaks OData.

The OData model mechanism is known as a server-side mechanism, in contrast to, for example, the JSON model mechanism, which is client-side. That's not to say that the JSON model can only be instantiated with data on the client side; the instantiation of a JSON model object can specify a URL from where JSON data can be loaded. The difference is in where the nominal postinstantiation "home" of the data lies.

With JSON, all of the data is loaded onto the client side (into the browser). With OData, only the data required to satisfy the current bindings is pulled from the server. The rest of the data remains on the server until required. Furthermore, we can use OData operations to write back to the server.

The use of OData operations via the OData model mechanism will cause the appropriate HTTP calls to be made implicitly to have the operation carried out. For example, if we initiate an OData `CREATE` operation in the application, an HTTP `POST` request will be constructed and sent.

27.2.3 Component-Based Best Practices

In any toolkit or framework as flexible and complete as SAPUI5, there will always be more than one way to achieve things. Often, the ideal approach is to follow best practices, and there's a strongly supported best practice to building applications and reusable application parts, which is based on the concept of a component. There are two types of components in SAPUI5: a faceless component, one which has no visible elements and can be used to build services; and a UI component, which is what we'll be using in our simple workflow application. The UI component, in the form of the `sap.ui.core.UIComponent` class, is what we'll be using as the "root" of our application's UI.

27.3 Sketching Out the Application

Now that we've covered some of the fundamentals and some of what SAPUI5 provides, it's time to start considering our application design. In this section, we'll sketch out and construct a simple UI using SAPUI5 features that we've explored previously. We'll be using a standard SAP Business Workflow service to access items, and the purpose of the application is to display items in a list, allow selection and the viewing of more detail, and finally offer the user a chance to approve or reject. We want to have the application run on desktops, tablets, and smartphones, so we'll use controls from the `sap.m` library. We want to access the workflow features in an ABAP stack system, so we'll use the OData model (this will come in the next section), and we'll use the MVC approach.

27.3.1 The sap.m.SplitApp Control

Now that we've picked the `sap.m` library to provide the core of our UI elements, we still have to make a decision on how our application will look overall. There are a number of design patterns that some of the controls in the `sap.m` library represent; one of those is the "Master Detail" pattern, which presents a list of items in a master view, and details of a selected item in a detail view.

On desktops and tablets, the master view is normally shown in the left third of the screen, and the detail view is normally shown in the right two-thirds. On smartphones and other small devices, either the master or the detail is shown at any one time, and transitions are used to hide or reveal information as appropriate.

In the `sap.m` library, the `SplitApp` control is exactly what we need to achieve this design pattern.

27.3.2 MVC and XML Views

We'll use MVC to separate out the different concerns of our application. Specifically, we'll define our views declaratively using XML. You may be wondering at this point exactly how we're going to use views, how many we'll have, and where they fit in, especially as we're going to use the `SplitApp` control to coordinate the rest of the UI. The `SplitApp` control has a couple of aggregations `masterPages` and `detailPages`, which suggest that the content of these aggregations should be, well, `sap.m.Page` controls.

This isn't a requirement, however, and to achieve full-on MVC, it's possible, and indeed common practice, to have these aggregations actually contain views with corresponding controllers. This is what we'll do. Figure 27.1 shows a schematic of how the views and other controls will fit together in a typical `SplitApp` constellation. Note that we're also going to be using the component approach, with a `UIComponent`, which is also shown in the schematic.

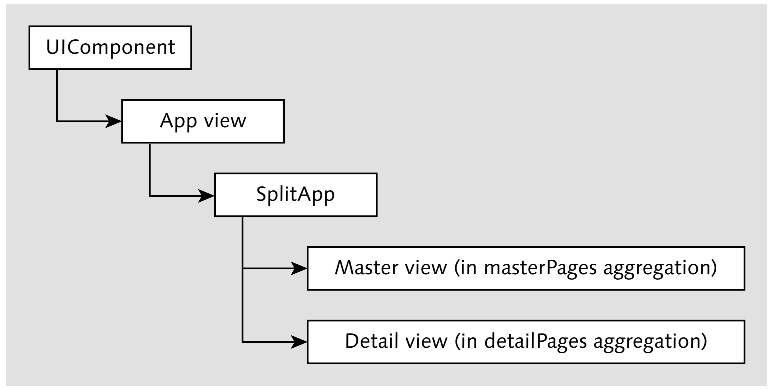

UIComponent
App view
SplitApp
Master view (in masterPages aggregation)
Detail view (in detailPages aggregation)

Figure 27.1 Relationship of UIComponent, SplitApp, and Views

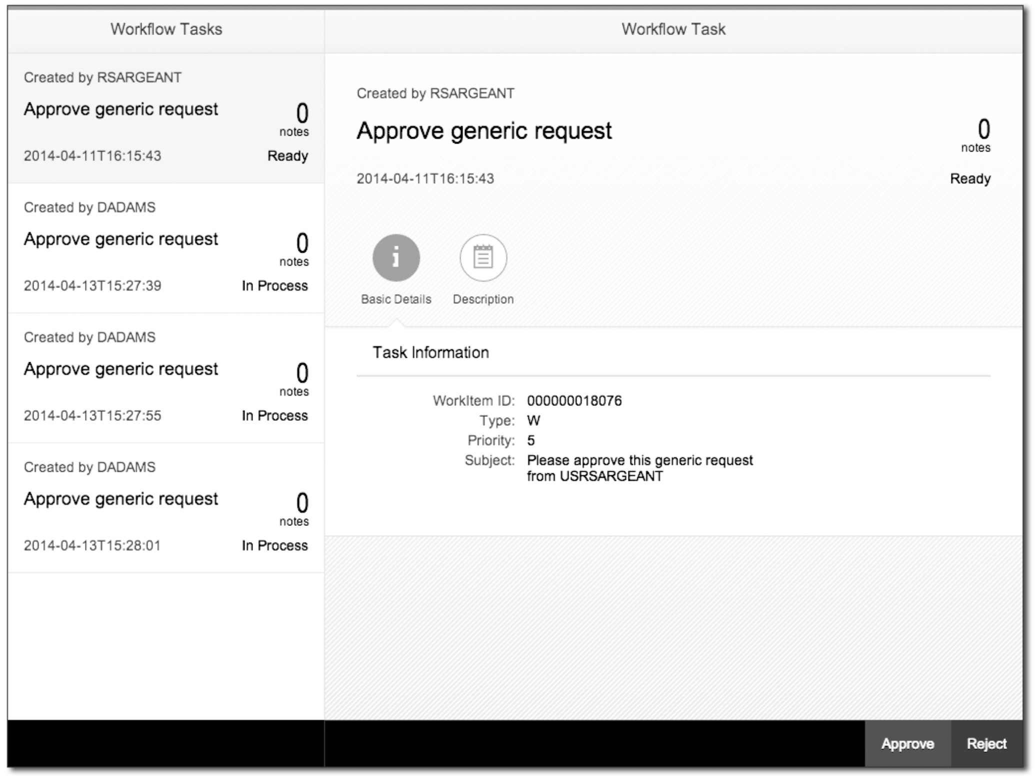
27.3.3 The Component

As you'll see when you explore the SAPUI5 documentation, the component concept is very powerful and flexible. We'll just scratch the surface in our application, but it's good practice to think and build in terms of component objects.

Now that we've looked at our building blocks for the application's UI, let's look at piecing it together.

27.3.4 What We're Aiming For

Let's take a look at what the master detail pattern translates to in real terms. Figure 27.2 shows our application UI rendered on a tablet. It would look very similar on a desktop.



Created by RSARGEANT
Approve generic request 0 notes
2014-04-11T16:15:43 Ready

Created by DADAMS
Approve generic request 0 notes
2014-04-13T15:27:39 In Process

Created by DADAMS
Approve generic request 0 notes
2014-04-13T15:27:55 In Process

Created by DADAMS
Approve generic request 0 notes
2014-04-13T15:28:01 In Process

Created by RSARGEANT
Approve generic request 0 notes
2014-04-11T16:15:43 Ready

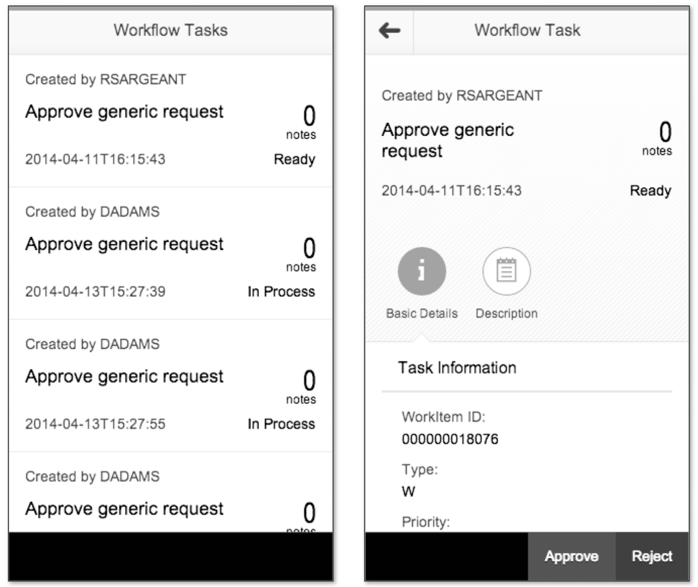
Task Information

WorkItem ID: 000000018076
Type: W
Priority: 5
Subject: Please approve this generic request from USRSARGEANT

Figure 27.2 Our Application UI on a Tablet

The master detail pattern is clear to see in the way the UI is divided into a one-third (master) and a two-thirds (detail) section. In the master, we see a simple list of workflow tasks awaiting action. In the detail, we see information for the selected task (the first in the list) and also a couple of action buttons to either Approve or Reject the task.

Before moving on, let's have a look to see how this UI is rendered on a smartphone in Figure 27.3.



Workflow Tasks

Created by RSARGEANT
Approve generic request 0 notes
2014-04-11T16:15:43 Ready

Created by DADAMS
Approve generic request 0 notes
2014-04-13T15:27:39 In Process

Created by DADAMS
Approve generic request 0 notes
2014-04-13T15:27:55 In Process

Created by DADAMS
Approve generic request 0

Workflow Task

Created by RSARGEANT
Approve generic request 0 notes
2014-04-11T16:15:43 Ready

Basic Details
Description

Task Information

WorkItem ID:
000000018076
Type:
W
Priority:

Approve
Reject

Figure 27.3 Our Application UI on a Smartphone: Master and Detail Views

As we've mentioned, only the master or the detail view is shown at any one time, and there's a navigation (back) button in the detail view to allow the user to return to the list in the master. Note also that the layout of the Basic Details (WorkItem ID, Type, Priority, etc.) has automatically adjusted itself, with values popping under the field names to fit the real estate available.

27.3.5 UI Construction: Step by Step

Let's take the UI construction step by step, and we'll soon have what you've seen in the previous figures.

Application Structure

With any SAPUI5 application that's hosted inside an HTML page, an overarching component to gather everything together, and a `SplitApp` with views (and their corresponding controllers), the final application structure will look like that shown in Figure 27.4.

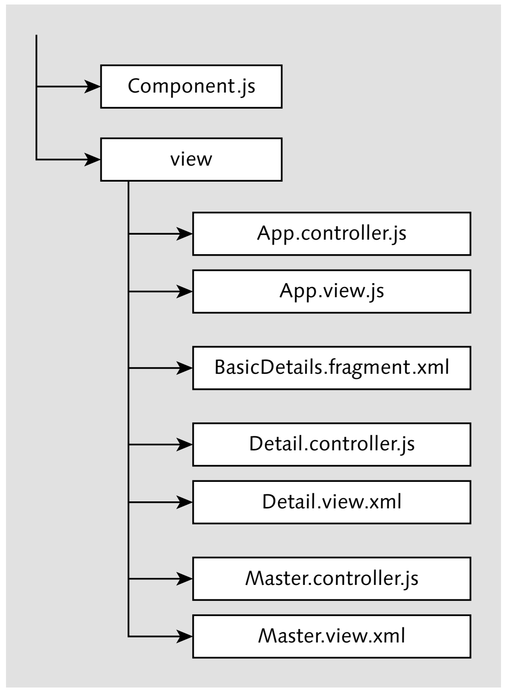


Figure 27.4 Application Structure

Application Index

In our case, the index.html represents the application itself and is retrieved when the application is requested in a standalone context, which is what we're aiming for here. In other scenarios, your application may be made available in the context of another HTML page such as with the SAP Fiori Launchpad, in which case the application index as presented here isn't relevant.

Best practice suggests that we keep the application index to a minimum. Listing 27.1 shows *index.html* in its entirety.

```
<!DOCTYPE HTML>
<html>
 <head>
   <meta http-equiv="X-UA-Compatible" content="IE=edge" />
   <meta charset="UTF-8">

   <title>Simple Workflow Demo App</title>

   <script id="sap-ui-bootstrap"
     type="text/javascript"
     src="/sapui5/latest/resources/sap-ui-core.js"
     data-sap-ui-theme="sap_bluecrystal"
     data-sap-ui-libs="sap.m"
     data-sap-ui-xx-bindingSyntax="complex"
     data-sap-ui-resourceroots='{"practicalworkflow": "./"}'>
   </script>
   <script>
     new sap.m.Shell({
       app : new sap.ui.core.ComponentContainer({
         height : "100%",
         name : "practicalworkflow"
       })
     }).placeAt("content");
   </script>
 </head>
 <body class="sapUiBody" id="content" />
</html>
```

Listing 27.1 index.html

After the meta tags that declare the character set and also give Internet Explorer hints that it should use the most up-to-date rendering (we don't have to do this for other browsers), we have the SAPUI5 bootstrap—a script tag that points to SAPUI5's core. There are various parameters that we pass:

- `data-sap-ui-theme`
  The `sap_bluecrystal` theme is the one that is used most often in conjunction with the `sap.m` controls, especially in the SAP Fiori user experience (UX) context.
- `data-sap-ui-libs`
  Normally, we'd declare the library loading requirements in the component, but because we're using a `Shell` control from the `sap.m` library here in the *index.html*, we want to have `sap.m` specified in the bootstrap.
- `data-sap-ui-xx-bindingSyntax`
  To allow us to do things such as mix literal strings with curly braced model property placeholders in our UI control properties (e.g., in the `ObjectListItem`'s intro property in the master view), we need to declare that we want to use "complex" binding syntax.
- `data-sap-ui-resourceroots`
  With this parameter, we can easily match up folder locations with control namespaces; in this case, we're saying that controls (the component and views, mostly) whose names start `practicalworkflow` are to be found in the current folder, which is represented by the path specification "./".

After we've declared the SAPUI5 bootstrap, it just remains for us to instantiate the component within a `ComponentContainer`, wrap that in a `Shell` control from the `sap.m` library (the `Shell` gives us some control over the application's visible width), and place the `Shell` into the HTML document.

27.3.6 Component Definition

Our component definition comes next. It's in a *Component.js* file in the same folder as the *index.html* (and will be found automatically through a combination of the earlier `resourceroots` declaration and the default name *Component.js* for the module that's loaded.

The definition is a very simple one, as this is a simple application, and is shown in Listing 27.2.

```
jQuery.sap.declare("practicalworkflow.Component");
sap.ui.core.UIComponent.extend("practicalworkflow.Component", {
 createContent : function() {
   // create root view
   var oView = sap.ui.view({
     id : "idViewApp",
     viewName : "practicalworkflow.view.App",
     type : "XML"
   });
   // set data model on root view
   var sWfServiceURL = "http://<server>:<port>/sap/opu/odata/IWWRK/
WFSERVICE/";
   var oModel = new sap.ui.model.odata.ODataModel(sWfServiceURL);
   oView.setModel(oModel);
   oModel.attachEventOnce("requestCompleted", function(oEvent) {
     sap.ui.getCore().getEventBus().publish("data", "ready");
   });
   // done
   return oView;
 }
});
```

Listing 27.2 Component.js

We inherit the `UIComponent` from `sap.ui.core` and declare a single method `createContent`, which SAPUI5 calls to ask for the visible controls that should be rendered.

We're using the MVC concept and so instantiate and return a top-level, or "root" view. All our views are XML views, and this one is no exception. The name `practicalworkflow.view.App` resolves to the file *App.view.xml* in the *view/* folder in our application directory.

At this stage, we'll gloss over the code that deals with the OData connection as we're just focusing on the UI for now; we'll come back to it in the next section.

27.3.7 Views and Controllers

Now it's time to have a look at that `App` view that we instantiated in the component, as well as its controller, and the other views and controllers for our application.

App View and Controller

The `App` view that was returned as the content for the component is declared in the *view/App.view.xml* file and is shown in Listing 27.3.

```
<?xml version="1.0" encoding="UTF-8" ?>
<mvc:View
 controllerName="practicalworkflow.view.App"
 displayBlock="true"
 xmlns:mvc="sap.ui.core.mvc"
 xmlns="sap.m">
 <SplitApp id="idSplitApp">
   <masterPages>
     <mvc:XMLView id="idViewMaster"
       viewName="practicalworkflow.view.Master" />
   </masterPages>
   <detailPages>
     <mvc:XMLView id="idViewDetail"
       viewName="practicalworkflow.view.Detail" />
   </detailPages>
 </SplitApp>
</mvc:View>
```

Listing 27.3 App.view.xml

It's very straightforward, and actually only contains a single control: `sap.m.SplitApp`. But let's first take a quick look at how the view itself is declared; this will be the same for all the views that follow.

The XML declaration is directly followed by the XML's root element—a `View` control from the `sap.ui.core.mvc` library. Note that we're using XML namespaces for the library prefixes; the convention in our sample application is that the default namespace (the one without an explicit prefix declaration) represents the library that we're going to use the most, `sap.m`. For the controls from other libraries (such as the `View` control itself), we declare a prefix; in this case, there's just one, `mvc`, for `sap.ui.core.mvc`.

With the namespace declarations out of the way, we can declare the controls in a clean and lightweight way, as we'll do here for the `SplitApp`.

As you've already seen, the `SplitApp` has a couple of aggregations (`masterPages` and `detailPages`), and we specify a `View` for each of these: the `practicalworkflow.view.Master` view for the `masterPages` aggregation, and the `practicalworkflow.view.Detail` view for the `detailPages` aggregation.

Note

You can see that the XML element names are either capitalized or not. The capitalized names (such as `SplitApp`) represent the controls, whereas the noncapitalized names (such as `masterPages`) represent aggregations.

The `App` view's controller is declared with the `controllerName` attribute and points to a name that happens to be the same as the view. But in this case, the default suffix of *.controller.js* means that this resolves to the file *App.controller.js*" in the same folder (*view/*) as the view. Refer to the application structure in Figure 27.4 for a reminder of where things are if you need to.

The `App` view's controller is shown in Listing 27.4.

```
sap.ui.controller("practicalworkflow.view.App", {
 onInit : function(oEvent) {
   this.oSplitApp = this.getView().byId("idSplitApp");
   // Have child views use this controller for navigation
   var that = this;
   this.oSplitApp.getMasterPages().forEach(function(oPage) {
       oPage.getController().navigation = that;
   });
   this.oSplitApp.getDetailPages().forEach(function(oPage) {
       oPage.getController().navigation = that;
   });
 },
 navTo : function(sPageId, oContext) {
   var sPrefixedPageId = this.getView().byId(sPageId).getId();
   this.oSplitApp.to(sPrefixedPageId);
   if (oContext) {
       this.oSplitApp.getPage(sPrefixedPageId).setBindingContext(oConte
xt);
   }
 },
 navBack : function() {
   this.oSplitApp.backMaster();
 }
});
```

Listing 27.4 App.controller.js

The `App`'s controller concerns itself mostly with navigation. In the controller's `onInit` event, we're sharing the navigation functions of the `SplitApp` control with the other views by making the functions of this controller available via a `naviga-tion` property of the master and detail views. For a simple application, this may be all you need, and is certainly all we need here.

There are two navigation functions that are used to navigate to and back from a detail view:

- `navTo`
  This is called from the master view's controller; it receives a page ID (`idView-Detail`), works out the fully qualified ID (in XML views controls are automatically prefixed), gets the `SplitApp` to navigate to it, and sets the data binding context appropriately.
- `navBack`
  This is called from the detail view's controller and simply gets the `SplitApp` to navigate back to the master.

Note that the page ID `idViewDetail` is taken from the ID given to the view when it was assigned to the `detailPages` aggregation of the `SplitApp` (refer to Listing 27.3).

Master View and Controller

The master view is where we define our list of workflow tasks and is shown in Listing 27.5.

```
<?xml version="1.0" encoding="UTF-8" ?>
<mvc:View
 controllerName="practicalworkflow.view.Master"
 displayBlock="true"
 xmlns:mvc="sap.ui.core.mvc"
 xmlns="sap.m">
 <Page title="Workflow Tasks">
   <content>
     <List
       id="idList"
       items="{/WorkflowTaskCollection}"
       mode="SingleSelectMaster"
       select="onListSelect">
       <ObjectListItem
         intro="Created by {created_by}"
         title="{task_name}"
         number="{note_count}"
         numberUnit="notes">
         <attributes>
             <ObjectAttribute text="{created_at}" />
```

```
        </attributes>
        <firstStatus>
          <ObjectStatus text="{status_txt}" />
        </firstStatus>
      </ObjectListItem>
    </List>
  </content>
 <footer>
   <Bar />
 </footer>
 </Page>
</mvc:View>
```

Listing 27.5 Master.view.xml

In this view, we're declaring a `Page` control from the `sap.m` library. A `Page` is a common UI building block for applications, especially in the `sap.m.SplitApp` and `sap.m.App` context. It has a header with a title (as you can see in Figure 27.3, where the title in the master is WORKFLOW TASKS) and the default `content` aggregation is where our task list is declared.

The task list is an `sap.m.List` control, which has an items aggregation that is bound to the OData entityset `WorkflowTaskCollection`. For each entity in this entityset, we display an `ObjectListItem`, also from the `sap.m` library, which presents various properties from the data model in a useful and concise way. You can spot the property bindings in the control by looking for the curly braces. You can read more about the data model properties in the next section.

The master view's controller must handle some navigation, but it's also used to cause the first item in the list of tasks to be preselected. Listing 27.6 shows the master view's controller.

```
sap.ui.controller("practicalworkflow.view.Master", {
 onInit : function(oEvent) {
   sap.ui.getCore().getEventBus().subscribe("data", "ready",
     this.selectFirstItem, this);
 },
 selectFirstItem : function() {
   if (!sap.ui.Device.system.phone) {
     var oList = this.byId("idList");
     var oFirstItem = oList.getItems()[0];
```

```
     oList.setSelectedItem(oFirstItem);
     this.navigateToDetail(oFirstItem);
   }
 },
 onListSelect : function(oEvent) {
   this.navigateToDetail(oEvent.getParameter("listItem"));
 },
 navigateToDetail : function(oItem) {
   this.navigation.navTo("idViewDetail", oItem.getBindingContext());
 }
});
```

Listing 27.6 Master.controller.js

We'll cover the `onInit` function in the next section. Suffice it to say that at the appropriate time, the `selectFirstItem` function is called to preselect the first item in the list. It does this unless the device is a smartphone, in which case, we don't want any item preselected or any navigation to the item's detail because the user would see the detail view first rather than the master view.

The following is a summary of the functions:

- `selectFirstItem`
  The `List` control is identified, the first item object is retrieved, and then the `List` control's `setSelectedItem` is called to highlight that first item. Finally, the controller's `navigateToDetail` is called to cause navigation to happen.
- `onListSelect`
  This is the handler for the `List` control's select event (refer to `select="onList-Select"` in Figure 27.1) and calls the controller's `navigateToDetail` with the object that represents the item that was selected.
- `navigateToDetail`
  Via the navigation connection to the `App` view's controller, this causes `SplitApp` navigation to the detail view to happen, passing the selected list item's binding context so it can be applied to the detail view after navigation.

Detail View and Controller

After a task has been selected from the `sap.m.List` control in the master view, the detail can be displayed for it in the detail view. Listing 27.7 shows the detail view.

```
<?xml version="1.0" encoding="UTF-8" ?>
<mvc:View
 controllerName="practicalworkflow.view.Detail"
 displayBlock="true"
 xmlns:mvc="sap.ui.core.mvc"
 xmlns:core="sap.ui.core"
 xmlns="sap.m">
 <Page
   id="idDetailPage"
   navButtonPress="onNavButtonPress"
   title="Workflow Task">
   <content>
     <ObjectHeader
       intro="Created by {created_by}"
       title="{task_name}"
       number="{note_count}"
       numberUnit="notes">
       <attributes>
         <ObjectAttribute text="{created_at}" />
       </attributes>
       <firstStatus>
         <ObjectStatus text="{status_txt}" />
       </firstStatus>
     </ObjectHeader>
     <IconTabBar id="idIconTabBar">
       <items>
         <IconTabFilter
           text="Basic Details"
           icon="sap-icon://hint">
           <content>
             <core:Fragment fragmentName="practicalworkflow.view.Basic
Details" type="XML" />
           </content>
         </IconTabFilter>
         <IconTabFilter
           text="Description"
           icon="sap-icon://notes">
           <content>
             <Panel headerText="Task Description">
               <content>
               <Text text="{description}" />
               </content>
```

```
             </Panel>
           </content>
         </IconTabFilter>
       </items>
     </IconTabBar>
   </content>
   <footer>
     <Bar>
       <contentRight>
         <Button
           text="Approve"
           type="Accept"
           press="onAcceptRejectButtonPress" />
         <Button
           text="Reject"
           type="Reject"
           press="onAcceptRejectButtonPress" />
       </contentRight>
     </Bar>
   </footer>
 </Page>
</mvc:View>
```

Listing 27.7 Detail.view.xml

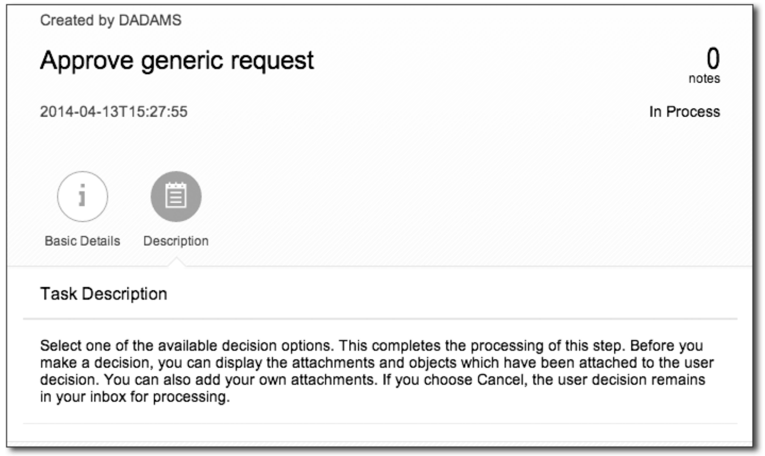
This is very similar to the declaration of the master view, in that it starts out with an `sap.m.Page` control, and everything else is within the `Page`'s default content aggregation.

The `Page` control is also similar to the one in the master view (it has a title and a footer with a `Bar` in it), but there are a couple of additions:

- A handler (`onNavButtonPress`) is declared for the `navButtonPress` event.
- The `Bar` has buttons on the right-hand side (in the `contentRight` aggregation).

As you'll see shortly in the controller, the navigation (or back) button is shown (it's the left-facing arrow in the header of the detail view's `Page` header in Figure 27.3), but only if the device is a smartphone. This is so that the user has some way of triggering the navigation back from the detail view to the list in the master view. If the device is large enough for the `SplitApp` to show both master and detail views simultaneously (as you can see in Figure 27.2), then the navigation button isn't needed.

The rest of the XML view declaration is straightforward; we use a number of `sap.m` controls, including an `IconTabBar` containing a couple of `IconTabFilters` to represent the Basic Details and Task Description data for the selected task. You can see an example of how the description is displayed in Figure 27.5.



Select one of the available decision options. This completes the processing of this step. Before you make a decision, you can display the attachments and objects which have been attached to the user decision. You can also add your own attachments. If you choose Cancel, the user decision remains in your inbox for processing.

Figure 27.5 Display of the Task Description

Perhaps the most interesting thing in the detail view declaration is the use of an XML fragment to contain the declaration of the `BasicDetails` layout. This is in a separate file *BasicDetails.fragment.xml*, also in the *view/* folder, and is shown in Listing 27.8.

```
<?xml version="1.0" encoding="UTF-8" ?>
<core:FragmentDefinition
 xmlns:l="sap.ui.layout"
 xmlns:f="sap.ui.layout.form"
 xmlns:core="sap.ui.core"
 xmlns="sap.m">
 <l:Grid
   defaultSpan="L12 M12 S12"
   width="auto">
   <l:content>
     <f:SimpleForm
       minWidth="1024"
       maxContainerCols="2"
       editable="false"
       layout="ResponsiveGridLayout"
       title="Task Information"
       labelSpanL="3"
       labelSpanM="3"
       emptySpanL="4"
       emptySpanM="4"
       columnsL="1"
       columnsM="1">
       <f:content>
         <Label text="WorkItem ID" />
         <Text text="{workitem_id}" />
         <Label text="Type" />
         <Text text="{type}" />
         <Label text="Priority" />
         <Text text="{priority}" />
         <Label text="Subject" />
         <Text text="{subject}" />
       </f:content>
     </f:SimpleForm>
   </l:content>
 </l:Grid>
</core:FragmentDefinition>
```

Listing 27.8 BasicDetails.fragment.xml

The layout of the Basic Details screen (WorkItem ID, Type, Priority, and Subject) is done using a combination of a responsive `Grid` control from the `sap.ui.layout` library and a `SimpleForm` control from the `sap.ui.layout.form` library. The declaration of the `span` and `column` properties allows the form to reshape itself sensibly, depending on the screen real estate available.

Buttons

Before moving on to look at the detail view's controller, we should examine the buttons in the footer's `Bar`. These `sap.m.Button` controls represent the OK and Cancel buttons shown in Figure 27.5, and later in Figure 27.6. The button colors are declared indirectly and semantically via the `Button`'s type property, and both buttons share a single handler for their press events. This handler is `onAcceptRejectButtonPress` in the controller.

We're almost there! Let's have a look at the detail view's controller, which is shown in its entirety in Listing 27.9.

```
jQuery.sap.require('sap.m.MessageBox');
jQuery.sap.require('sap.m.MessageToast');
sap.ui.controller("practicalworkflow.view.Detail", {
  mDecKeys : {
    "Accept" : "0001",
    "Reject" : "0002",
    "Forward" : "0003"
  },
  onInit : function() {
    var oPage = this.getView().byId('idDetailPage');
    oPage.setShowNavButton(sap.ui.Device.system.phone);
    var oDescriptionFilter = this.byId("idIconTabBar").getItems()[1];
    oDescriptionFilter.bindElement('Description');
  },
  onNavButtonPress : function(oEvent) {
    this.navigation.navBack();
  },
  onAcceptRejectButtonPress : function(oEvent) {
    var sActionType = oEvent.getSource().getType();
    sap.m.MessageBox.confirm(
      "Are you sure you wish to take this action?",
      jQuery.proxy(function(sConfirmation) {
        if ("OK" === sConfirmation) {
          this.processAction(sActionType);
        }
      }, this),
      "Please confirm"
    );
  },
  processAction : function(sActionType) {
    var sDecKey = this.mDecKeys[sActionType];
    if (sDecKey) {
      var oView = this.getView();
      var sWorkItemId = oView.getBindingContext().getProperty('workitem
_id');
      var oModel = oView.getModel();
      oModel.callFunction(
        "ApplyDecision",
        "POST",
        {
          "workitem_id" : sWorkItemId,
          "dec_key" : sDecKey
```

```
        },
        null,
        function() {
          sap.m.MessageToast.show(sActionType + " action processed succ
essfully");
        },
        function() {
          sap.m.MessageToast.show("Problem executing " + sActionType +
" action");
        }
      );
    }
  }
});
```

Listing 27.9 Detail.controller.js

Before taking the functions one by one, let's take a look at the top of the *Detail.controller.js* file. We have a couple of require statements, to bring in static classes `sap.m.MessageBox` and `sap.m.MessageToast`, functions from which we'll be using when we handle the actions triggered by the OK and CANCEL buttons.

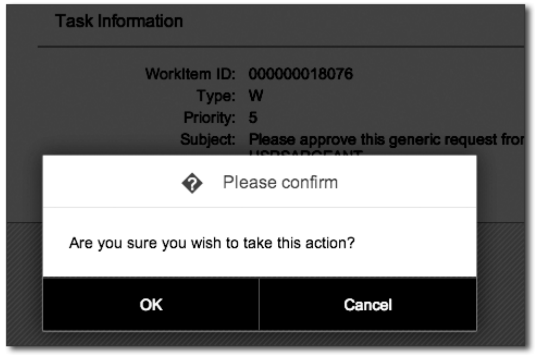
We also have a static map of decision keys that's located in the controller definition. This is hard-coded here; we could have taken the possible decision keys from the server, but we're doing it this way to keep things simple.

Here are the functions one by one:

- `onInit`
  In our function to handle the view's initialization, we set the navigation button's visibility depending on whether our device is a smartphone or not. We also explicitly call `bindElement` on the `IconTabFilter` representing the task's description, which we'll explain in the next section.
- `onNavButtonPress`
  If a navigation button is visible, and it's pressed, this handler is called and uses the `SplitApp`'s navigation mechanisms (via the `navigation` property) to go back to the master view.
- `onAcceptRejectButtonPress`
  When this handler is called, we look at the event's source (via the standard `getSource` function from the `event` object that is passed to the handler) to determine what was pressed. We're using a simplistic mechanism here by

looking at the button's semantic type definition, which will either be `Accept` or `Reject`. We then ask the user for confirmation by showing a confirmation message box (see Figure 27.6). If OK (rather than CANCEL) is pressed, then we call the `processAction` function to carry out the task decision process.

- `processAction`
  This is where the decision is made, and the task is approved or rejected as directed. As this is a connection to the server, you can find the description in the next section.


Task Information

WorkItem ID: 000000018076
Type: W
Priority: 5
Subject: Please approve this generic request for

Please confirm

Are you sure you wish to take this action?

Figure 27.6 The Confirmation Message Box in Action

27.4 Frontend, Meet Backend

Now that the application's UI is defined, it's time to turn our attention to the workflow data itself. This is on the SAP backend, along with functions to manage it. Being an outside-in application, this is exactly where we expect it to be; our application logic that is used to interact with the user runs on the client, but the key business data is in SAP.

In the following sections, we'll look at how to access workflow data in the SAP backend from our application's UI.

27.4.1 SAP Gateway and OData

The integration layer of choice today for ABAP stacks is SAP Gateway. If you have a 7.40 system, the SAP Gateway components will be available by default. If not, you can install SAP Gateway either directly in your enterprise system or on a

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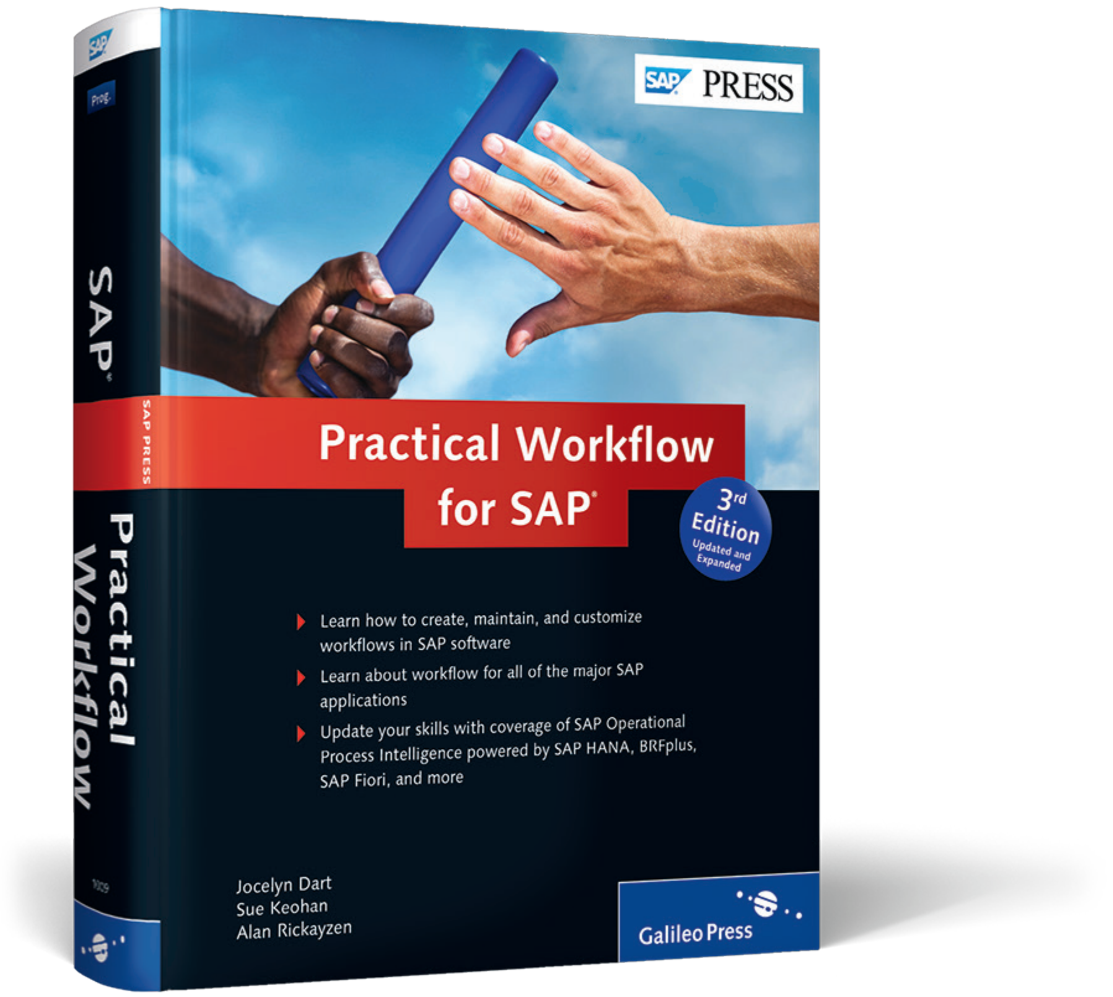
First-hand knowledge.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