



SAP TechEd 2007 : Community Day The Recipe To Cook-up the Perfect Composite Soup

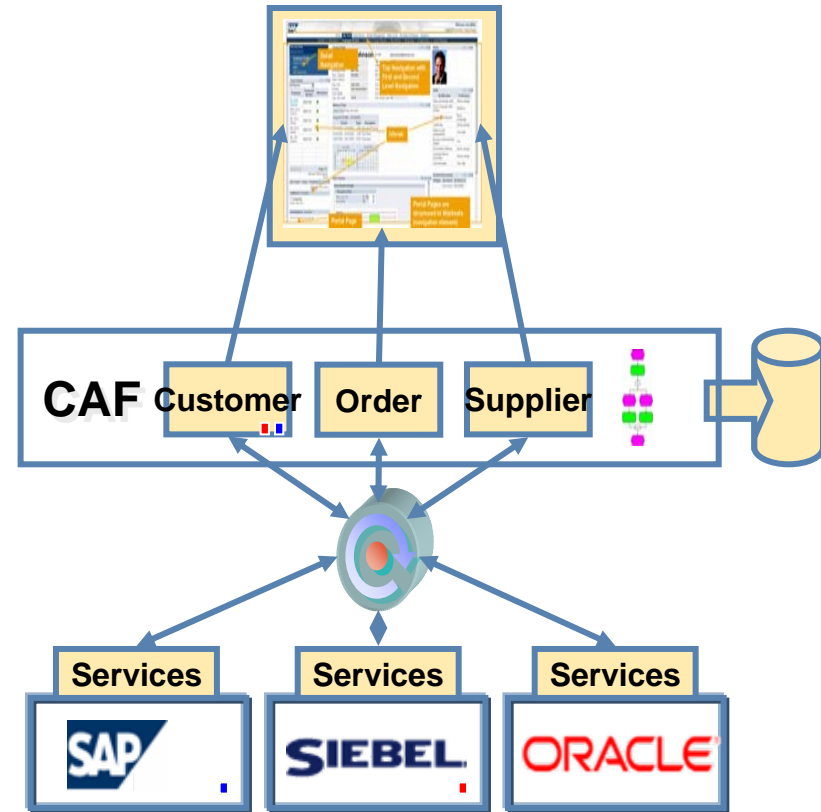
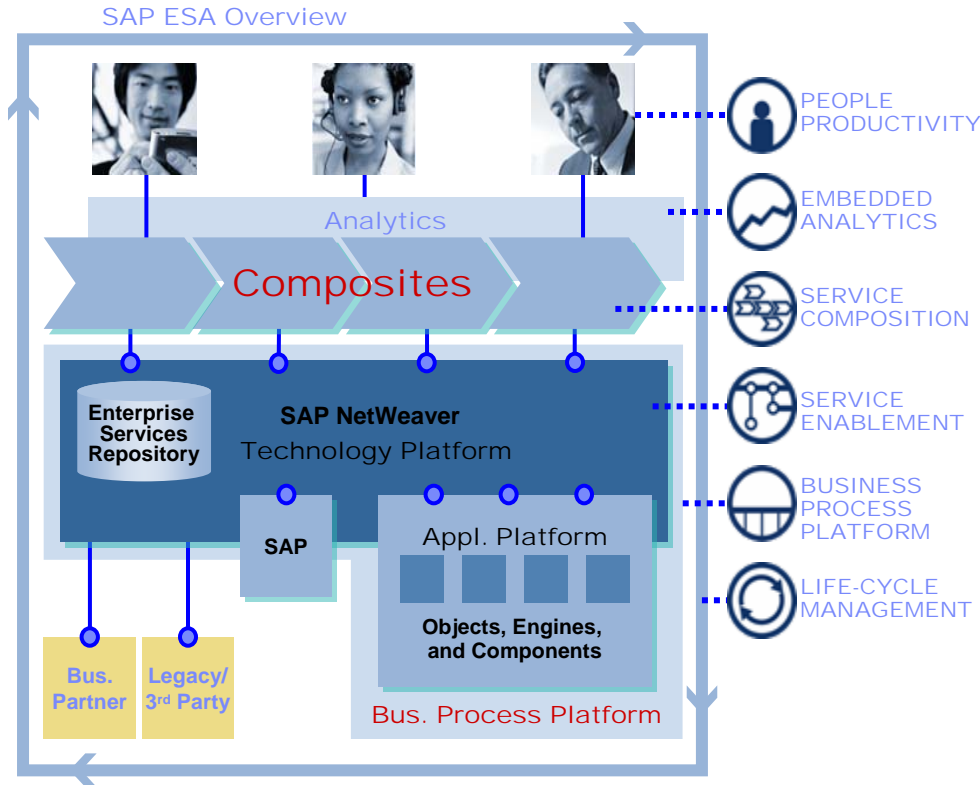
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IBM India



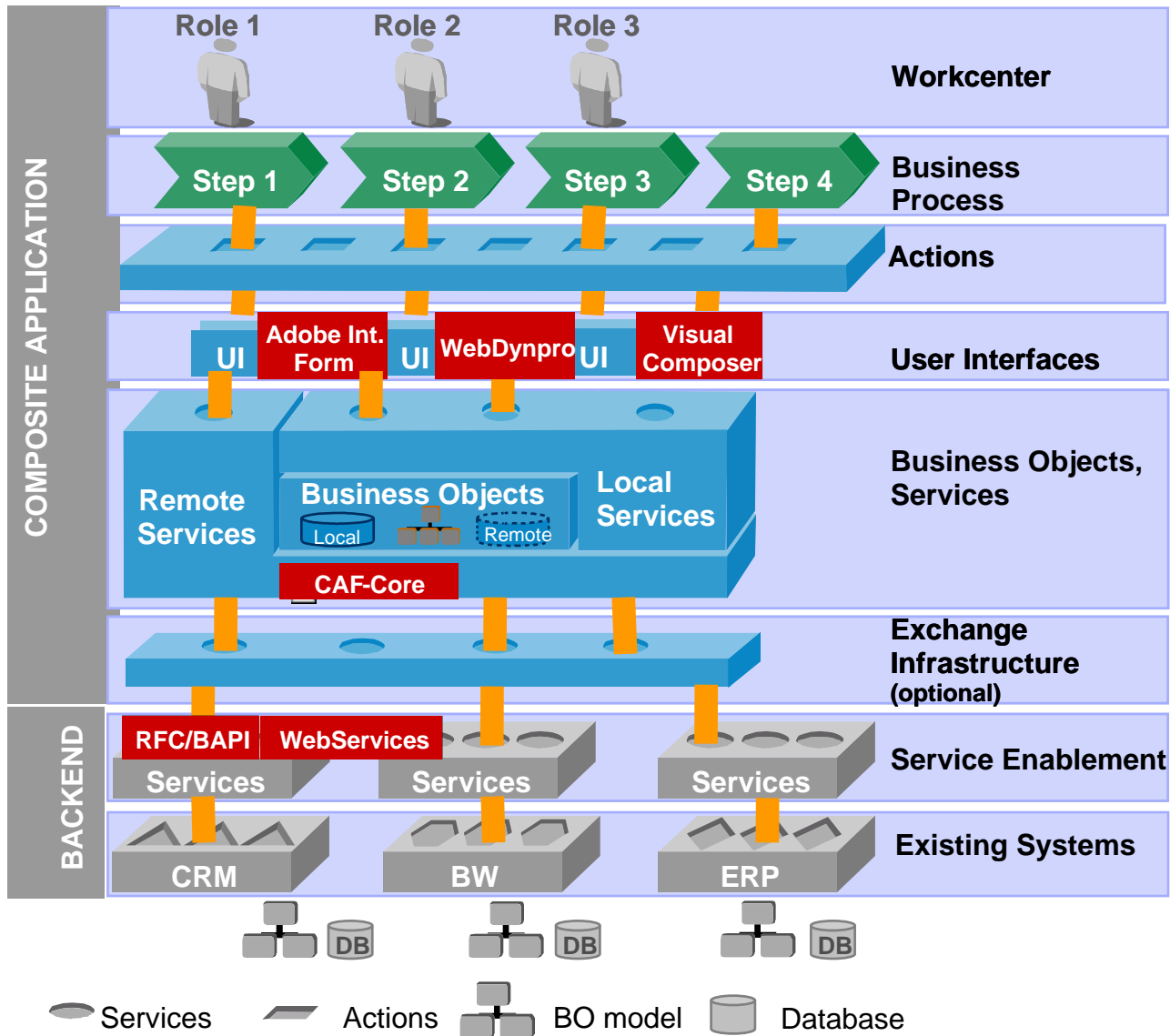
Agenda

- **What do you want to have today?**
 - **SAP NetWeaver Composite Application Overview & Architecture**
- **Decide the menu**
 - **Specifying Composite Application**
- **Getting the recipe**
 - **Designing Composite Application**
- **Making the soup**
 - **Developing Composite Application**

Composites in SAP NetWeaver



Architecture of Composite Application



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Specifying Composite Application – Business Problem

- Describe the business problem in detail which will be addressed by the composite application.
- It is good to state the criticality of the business problem also so that it may help in understanding the demand of the solution in market.

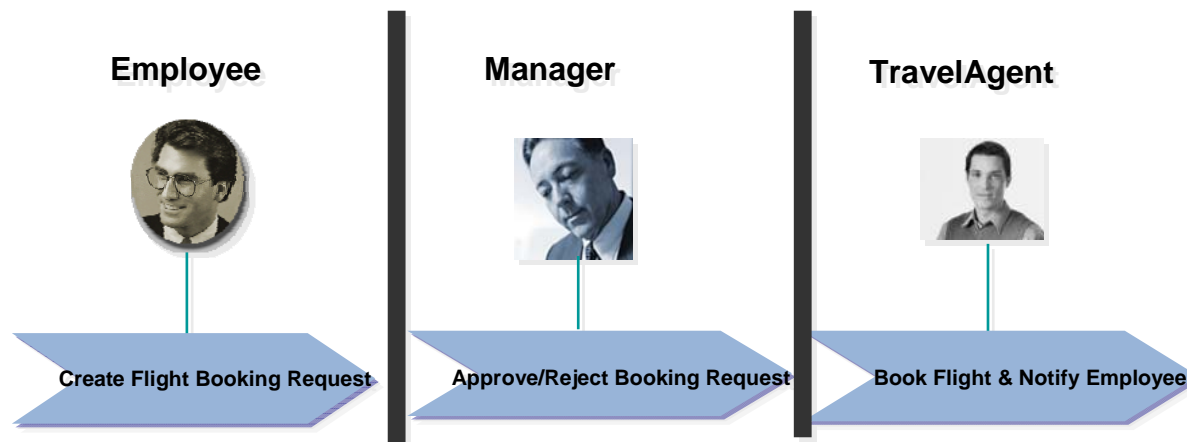
Process title: Employee Travel Request Management

Describe the business problem the new solution addresses	
An organization has business operations throughout the country and its employees need to travel to different cities mostly by air. Till now it was being done in a disorganized manner by the individual employees through various travel agents. This was causing serious governance problems as the organization is growing by size and its travel requirement is also increasing. To improve the situation organization wants to build a simple composite application which should have an approval mechanism so that the whole process can be managed better and in an organized way.	
Describe the idea behind the solution	
The situation can be improved by building a simple composite application where an employee can search for the available flights from an airlines, can raise a booking request with the flight of his choice. But the booking can only be done if it is reviewed carefully and approved by the manager. Once the manager approves the booking request, the booking can be done the travel desk with notification to the employee and his/her manager.	
Describe the market and the value of the solution (attach business case)	
Using this application it is expected to improve efficiency of the travel management process. Plus it will improve cost related values (reduce costs, better cost control), reduce error rate, increase throughput, increase accuracy.	
Backend integration: solution should support several releases of the backend systems accessed	Basic numbers (e.g. # users; # business objects; access frequency)
Yes (SAP ERP 2005) No	Total 500 user but expected to increase @ 50 per quarter.

Specifying Composite Application – Business Process & User Roles

- The business process which will address the issue should be described at a high level. A business process diagram is a must here. An example of the business process diagram is as below:

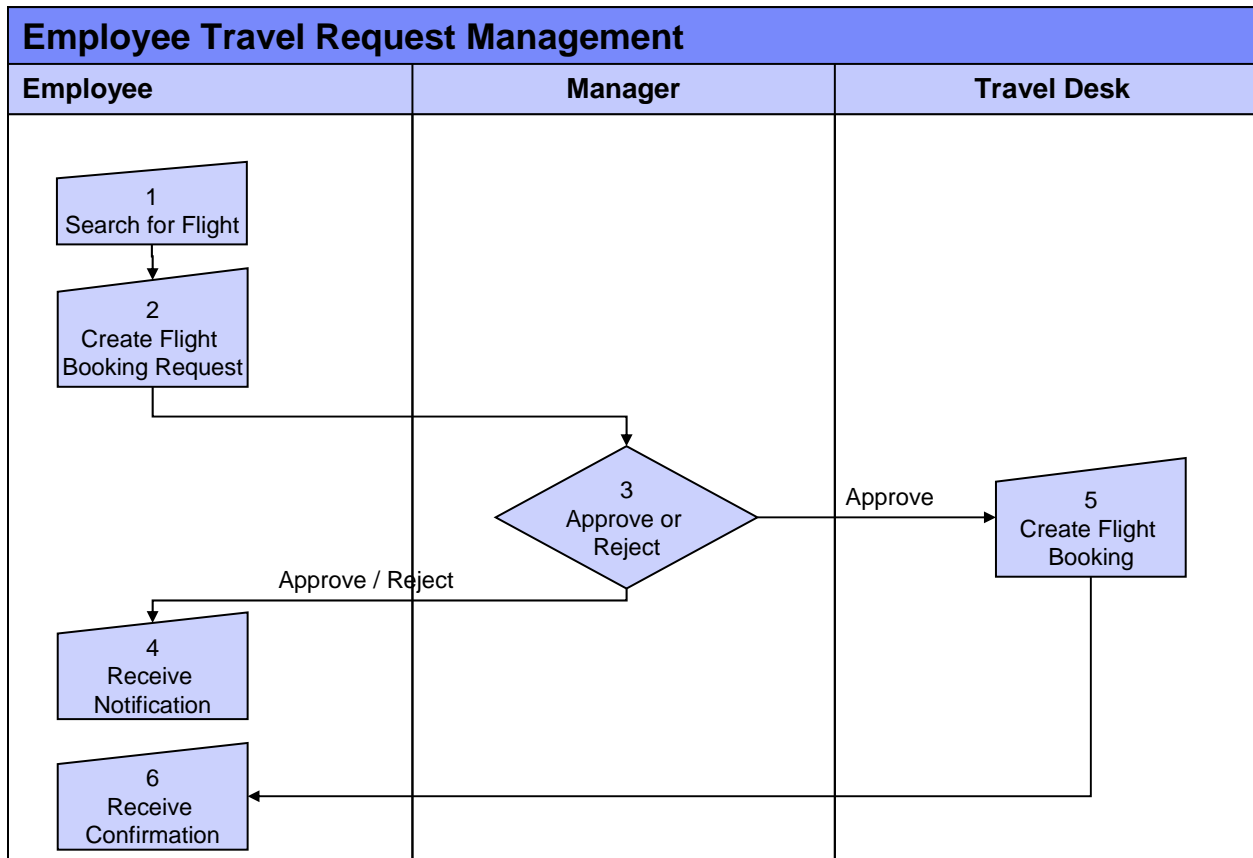
Employee Travel Request Management



- The business process diagram will give a basic idea of the process and process roles.
- Each high level step can be broken down into granular sub-steps which will be done in later sections.

Specifying Composite Application – Process Steps

The business process described in previous step should be decomposed into granular steps. The process steps should be depicted in a detailed business process flow diagram as below:



Specifying Composite Application – Process Steps

Also describe each of the process steps in the following table format:

Step No	Step Title	Step Description	Interactive (I) or Background (B)	Man-datory	Due date handling required	Role	Exits Next Step
1	Search Flight	Employee enter the search criteria and submit search	I	Y	N	Employee	Default ◇ 2
2	Create Flight Booking Request	Employee selects a flight from the list and submit booking request	I	Y	N	Employee	
3	Decide On Booking Request	Manager decides on the Request	I	Y	Y (within 24 hours)	Manager	Approved ◇ 4,5 Rejected ◇ 4
4	Receive Notification	Employee receives decision	I	Y	N	Employee	Default ◇ end
5	Book Flight	Clerk updates original order	I	Y	Y (within 24 hours)	Clerk	Default ◇ end

Specifying Composite Application – User Interfaces

The user interfaces for each interactive process step should be specified using screen mock-ups. This will help while designing and developing the user interface.

Search Flight

From:

To:

Date:

Class:

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Designing Composite Application – Service Identification

- Composite applications are based on services and following SOA principles.
- Each process step is based on a service. Identify the services underlying each process step. For example Create Travel Booking Request is a service consumed by the first step of the composite application.
- These are the composite services which provide complete business functionality.

List down all the identified services in a table like below:

Service Name	Description
CreateTravelBookingRequest	Creates a flight booking request
ApproveTravelBookingRequest	Approves or rejects a travel booking request
CreateTravelBooking	Creates a flight booking based on the request

Designing Composite Application – Service Decomposition

- In the next step decompose the composite services identified in the previous step into granular atomic services if possible.
- An identified service may perform a set of activities which are executed by a series of atomic services.

List down all the atomic services for each of the composite services identified in the above step in a table as below:

Composite Service	Atomic Services	Description
CreateTravelBookingRequest	SearchFlight	Search Flight
	CheckEmployeeEligibility	Checks the employee eligibility for the selected flight
	CreateTravelBookingRequest	Creates a booking request
	SubmitTravelBookingRequest	Submit the booking request for approval
ApproveTravelBookingRequest	ReviewTravelBookingRequest	Reviews the booking request
	ApproveTravelBookingRequest	Approves or rejects the travel request
CreateTravelBooking	BookFlightForEmployee	Books a flight for the employee
	UpdateBookingRequest	Updates the booking request with booking details
	CreateInvoice	Creates invoice for the flight booking
	NotifyEmployee	Notifies the employee

Designing Composite Application – Service Mapping

- In the next step map each atomic service identified in previous step to services from existing assets wherever available as below.
- Wherever a corresponding service is not available from any existing asset it should be provided by the composite application

Atomic Service	Type	Provider	Provider Service	Existing/New
SearchFlight	RFC/BAPI	SAP ECC	BAPI_FLIGHT_GETLIST	Existing
CheckEmployeeEligibility	Web Service	SAP ECC	ECC_ReadEmployeeById QR	Existing
CreateBookingRequest	Web Service	TravelManagement (Composite)	CreateBookingRequestForEmployee	New

Designing Composite Application – Business Objects/Entity

- Define the business objects used in the process. Each service is provided by a Business Object i.e. an atomic service is an operation of a business object.
- Some business objects are available in the backend while some are custom business objects to be modeled in the composite layer.
- The source of the business objects should be specified along with the persistency.
- Also the attributes of the business objects should be defined here.

Business Object/Entity	Description	Attributes	Datatype	Custom findBy Methods	Related BO/Entity	Association Type	Persistency	Backend
Employee	Business Object for employee	employeeID	String	findByEmployeeID	BookingRequest	Composition	Remote	SAP ECC
		employeeName	String					
		employeeDepartment	String	findByEmployeeDept				
BookingRequest	Business Object for travel booking request	requestID	String	findByRequestID			Local	NA
		requestText	String	findRequestByEmployeeID				
		requestType	String					
		flightNumber	String	findByStatus				
		startDate	DateTime	findByTravelDate				
		endDate	DateTime					
		status	String					

Designing Composite Application – Process Blocks

The process steps identified along with the services and user interfaces identified defines the composite process which will be developed using Guided Procedure. Specify the process blocks to be developed in Guided Procedure in the table format as below:

Block Name	Block Type	Action	Callable Object	CO Type	ResultState	Target
CreateTravelRequest	Sequential Block	CreateTravelRequestAC	CreateTravelRequestCO	Web Dynpro Java (GP Interface)	Submit	ApproveTravelRequestAC
					Cancel	TerminateProcessAC
		TerminateProcessAC	TerminateProcessCO	Terminate Process (Process Control)	Success	End
ApproveTravelRequest	Sequential Block	ApproveTravelRequestAC	ApproveTravelRequestCO	Web Dynpro Java (GP Interface)	Approve	CreateFlightBookingAC
		SendRejectionMailAC	SendRejectionMailCO	Send Notification	Reject	SendRejectionMailAC
					Success	TerminateProcessAC
CreateFlightBooking	Sequential Block	CreateFlightBookingAC	CreateFlightBookingCO	Web Dynpro Java (GP Interface)	Success	NotifyBookingDetailsAC
					Failure	CreateTravelRequestAC
		NotifyBookingDetailsAC	NotifyBookingDetailsCO	Send Notification	Success	No Target

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Process Steps for Composite Application Development



	Modeling	Development	Configuration	Adapting
ARIS for SAP NetWeaver	(1) Design business process			(16) Adapt / redesign business process
EP: CAF-Guided Procedures	(2) Model process flow (3) Model or reuse blocks, actions, callable objects		(10) Add missing callable objects (11) Personalize collaborative process (12) Configure process authorizations	(17) Change process flow, blocks, actions callable objects
DI: NetWeaver Developer Studio:	(4) Design data model	(6) Import external services (7) Generate entity services (8) Implement business logic (9) Develop WD components (GP Interface)	(13) Configure services (14) Configure WD components	(18) Modify/extend data model, external services, business logic (19) Modify/extend WD component
EP: Portal Content Studio	(5) Model Portal/Workcenter navigation		(15) Add to Portal/Workcenter roles and pages	(20) Adapt Portal/Workcenter

Developing Composite Application – Service Layer

- The service layer in a composite application is developed using the CAF Core.
- CAF Core is the composite business logic layer where the Enterprise Services from backend systems are consumed and additional logic for the composite application are developed

Development Tasks

- Import external services from backend systems
 - import RFC/Enterprise Services
- Develop Business Objects/Entities
 - define BO structure
 - define BO relationship
 - define BO persistency
 - define custom findBy operations
- Develop Application Services
 - define BO dependency
 - create operations
 - implement operations
 - expose as web service



Tips To Remember

- SAP PI can be used for abstracting backend systems and in complex/multiple backend scenarios e.g. message spilt
- Reuse CAF Core projects within the same composite
- Use external services directly in the application services instead of mapping them with Entity/Business Objects
- Model the Entity/Business Objects as a placeholder of the delta information not present in the backend systems
- Define user/application messages in Entity/Business Objects with language dependency

Developing Composite Application – UI Layer

- The user interfaces for composite application should be developed after developing the service layer in composite application. The user interface of a composite application on NetWeaver platform can be developed using the following user interface technologies:
 - Web Dynpro Java
 - Visual Composer
 - Adobe Interactive Forms
- Each of the above mentioned UI technologies can be used separately or in conjunction with others developing the user interface of the composite applications

Developing Composite Application – UI Layer (Web Dynpro)

- Web Dynpro Java is a most commonly used user interface technology for composite application development.
- It provides lot of flexibility for the developer to design the UI and develop the presentation logic.
- It follows the model-view-controller (MVC) architecture where the model represents the data access layer or the composite service layer.
- Use Web Dynpro as the UI technology for your composite application if the user interface is complex and requires screen validations.
- CAF Services can be consumed in Web Dynpro using Adaptive Web service model
- Complex presentation logic can be developed by coding
- Adobe Interactive Form can be integrated in Web Dynpro views
- Implement Web Dynpro Java callable object implementing GP interface

SA-Category Level Fund Creation

Welcom TMM

Select Sales Area

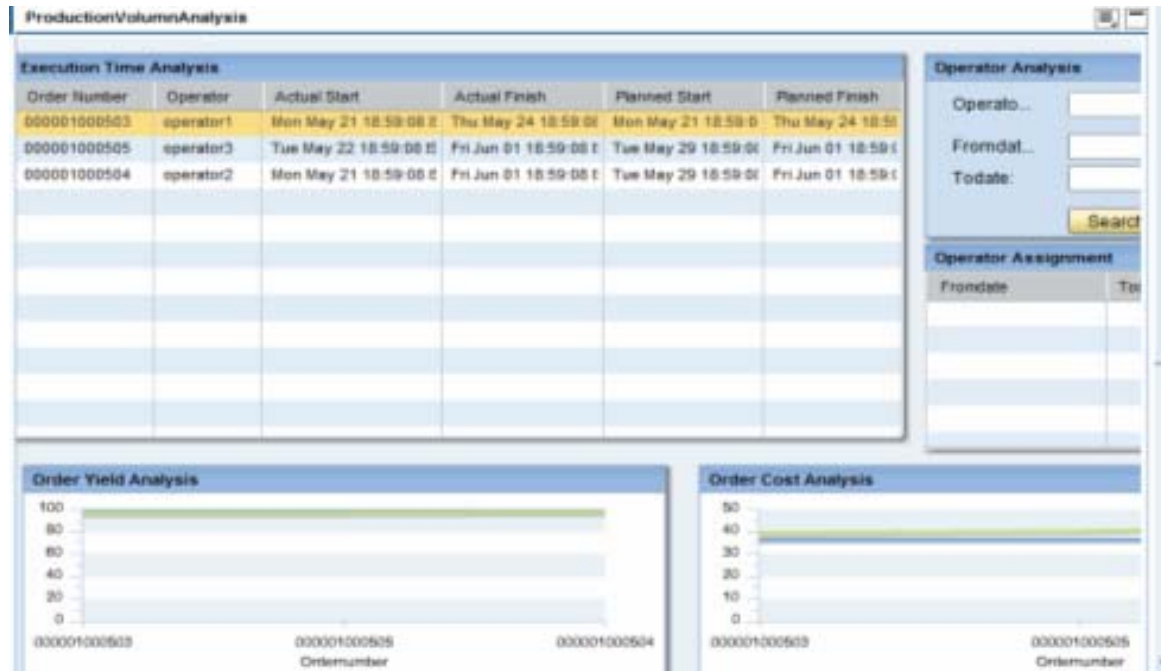
Sales Organization Distribution Channel Division

Fiscal Year

Fund ID ⇅	Start Date ⇅	End Date ⇅	Product Category ⇅	Target Revenue ⇅	Target Volume ⇅	UoM ⇅	Target Budget ⇅	Currency ⇅

Developing Composite Application – UI Layer (Visual Composer)

- Visual Composer is a tool for developing user interfaces for composite applications using model driven development and without any coding.
- The user interface in Visual Composer is developed consuming the composite services i.e. application services exposed as web services.
- Either Flex or Web Dynpro runtime can be used for UI rendering
- Implement callable object as VC portal view



Developing Composite Application – UI Layer (Adobe Interactive Forms)

- Adobe Interactive forms can be used for composite applications supporting business processes where lots of paper based forms are used. Adobe Interactive Form can replace these paper based forms as online interactive electronic pdf files.
- Offline processes can also be supported using the Adobe Interactive Forms.
- Configure the Interactive Form template in GP design time to use it as callable object in GP

Order Assignment Details For Operator operator1 operator1

Order Number	1000000	Priority	1
Start Date	May 21, 2007		0:00:00
Finish Date	May 24, 2007		0:00:00
Production Start Date	May 22, 2007		1:00:00
Production Finish Date	May 22, 2007		12:02:45 PM
Leading Order		Production Scheduler	001
Material	020000000100150000	Fruitless Filing	Batch
Target Quantity	100	LB	Scrap 10 LB
Plant	US04	Storage Location	Reservation Number 0000003604

Tips To Remember

- No business logic in UI layer
- UI layer should consume the CAF services as Web Services. Do not use CAF Web Dynpro model in Web Dynpro Java
- UI components are integrated into GP as callable objects
- Stand-alone UI iviews can also be created if required
- Single Web Dynpro component can be re-used in different steps of workflow scenario

Developing Composite Application – Process Layer

- The process layer of a composite application defines the flow of the business process for composite application.
- Guided Procedure is used to develop multi-role process .
- The services and user interfaces developed as part of the composite application are used in the Guided Procedure as callable objects for each process step.
- Different types of callable objects are available in Guided Procedure e.g. Web Dynpro (GP Interface), Visual Composer, Portal iView, Composite Application Service, etc to use the user interfaces and the application services in Guided Procedure.
- To develop single user processes for the composite application Guided Activity should be used. Guided Activity does not involve any workflow or BPM engine and implemented by the Roadmap control in Web Dynpro with buttons for navigating back and forth the process steps.

Process: Travel Request Management

Flow

Name	Type	Target	Item
Travel Request Management	Process		Travel Request Management
Create Travel Request	Sequential Block		Create Travel Request
Search Flight	Action		Search Flight
Create Request	Action		Create Request
Approve Travel Request	Precondition Loop Block		Approve Travel Request
Process Travel Booking	Parallel Dynamic Block		Process Travel Booking

Developing Composite Application – Process Layer

- Different Blocks are available to define the process flow in Guided Procedure :
 - **Sequential Block** for sequential execution of actions
 - **Parallel Block** for parallel execution of actions
 - **Parallel Dynamic Block** for parallel instance execution
 - **Pre-conditional Loop Block & Post-conditional Loop Block** for looping actions
 - **Alternative Block** for alternate branching of actions

- Callable objects are executable elements of Guided Procedure
 - User Interfaces (Web Dynpro, Visual Composer, Adobe Forms) can be implemented as CO
 - Web Services/Composite Services can be also implemented as CO
 - Process flow (action target) can be defined using resultstates of callable objects

Tips To Remember

- Instead of specifying a UME role for initiator use “Initiator” for the first action and add the process iview to the specific portal role
- Do not pass huge data in GP context – use an unique ID
- Save the GP process instance ID in the CAF layer to open the running process from a custom UI
- Assign the administrator, overseer roles of the process to an actual administrator
- Process runtime dashboard is useful to monitor the running processes

Developing Composite Application – Integrating in Enterprise Portal

- Design the navigation map for the end-user
- Create iViews for GP processes
- Create iViews for stand-alone user-interfaces
- Add iViews and pages in relevant worksets and roles

Refer the following document for more information on composite application development:

[Composite Application Development Cookbook](#)