



Interactive Realtime Multimedia Applications
on Service Oriented Infrastructures

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***Workflow Management and Monitoring in
Distributed, Virtualized Computing***

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Outline

- Service Oriented Architectures
- Workflows and Workflow Management Systems
- Modelling of workflows in IRMOS
- Enactment of workflows in IRMOS
- Monitoring and Evaluation in IRMOS

Service Oriented Architectures: Introduction



- Applications are split up into services
- Services
 - Execute a specific task
 - Are autonomous
 - Expose only the way to call them
- Services do not incorporate any process logic within them.
- A Workflow Management System is needed

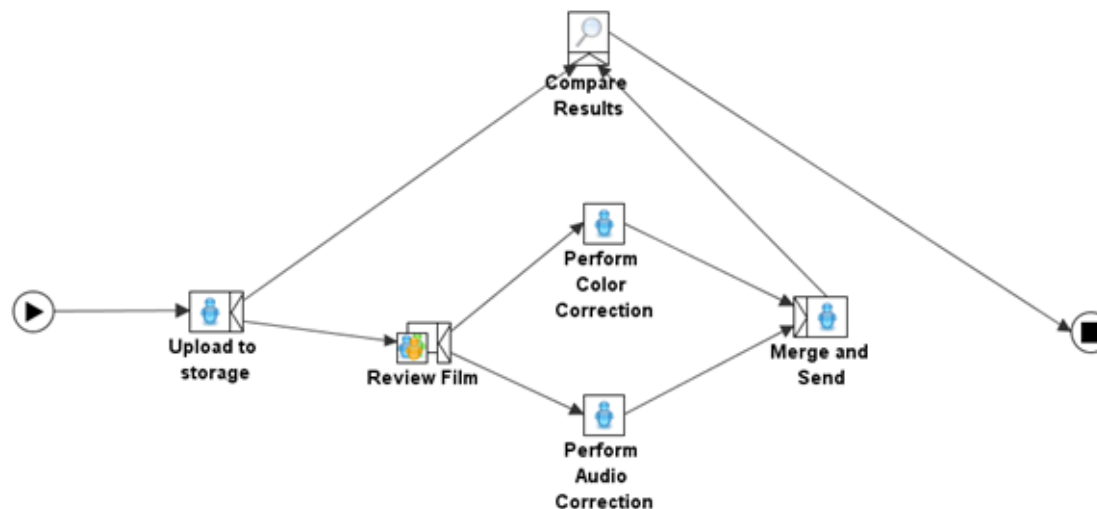
What is a workflow?

“Workflow is the **automation** of a **business process**, in whole or part, during which documents, information or tasks are passed from one participant* to another for action, according to a set of **procedural rules**”

*participant= human or machine

Workflow Management Coalition (WFMC)

□ Basically *Who* does *What* and *When*



What is a Workflow Management System (WfMS)?



- A system to support the full lifecycle of a workflow
- Two phases:
 - *Modeling* of the workflow, where it is composed using some language
 - *Enactment*, where the various tasks are executed according to the specification

Workflow Modelling

- First phase of the workflow lifecycle
- Workflows are modelled so they can be:
 - Communicated to others (e.g managers, team members).
 - Exchanged (e.g with other teams doing similar processes)
 - Integrated (e.g with other computer systems)
 - Optimized (e.g. Find loops or parts that can be executed synchronously)
- Graphical Models translated into some language

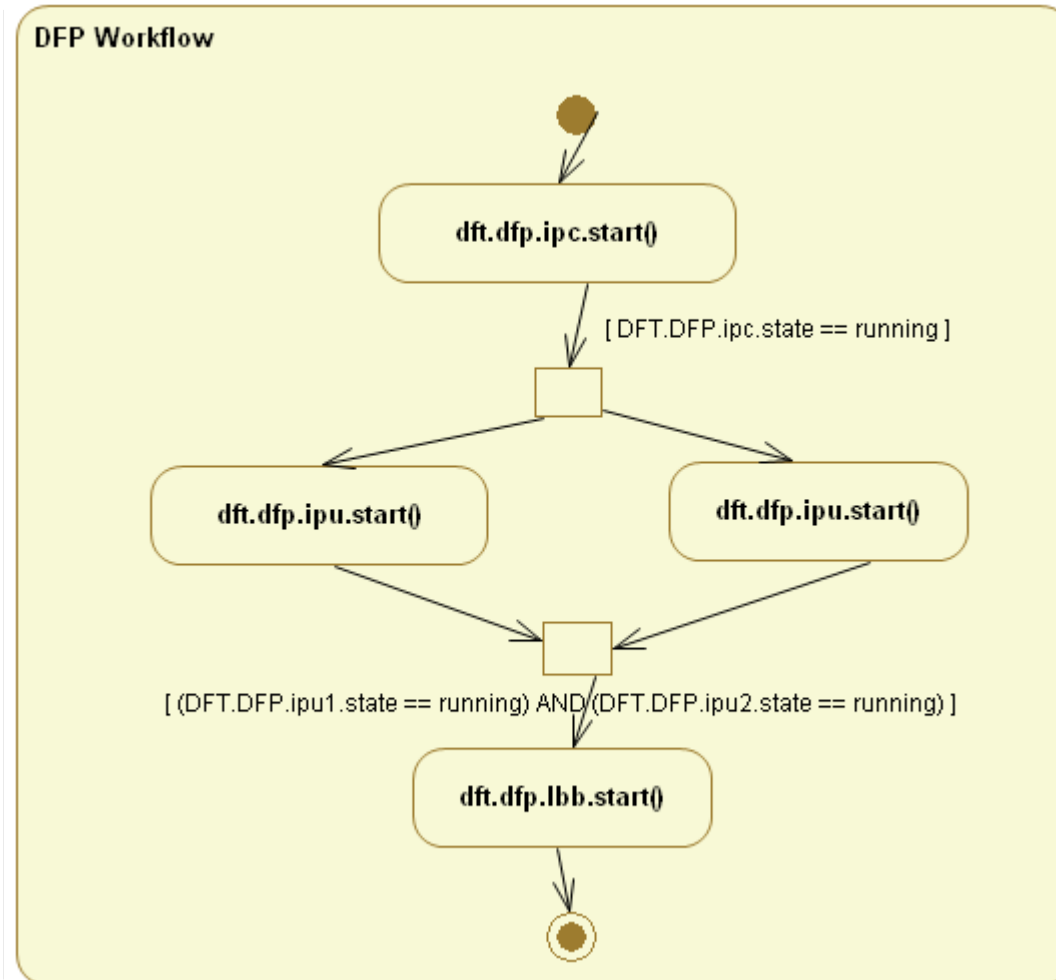
Workflow Languages

| Standard | Organization | Type |
|--|---|--|
| Business Process Execution Language (BPEL) | OASIS | Execution Language |
| Business Process Modeling Notation (BPMN) | Business Process Management Initiative (BPMI) | Notation language |
| Business Process Modeling Language (BPML) | BPMI | Execution language |
| Business Process Query Language (BPQL) | BPMI | Administration and monitoring interface |
| Business Process Semantic Model (BPSM) | BPMI | Process metamodel, in fashion of Object Management Group (OMG) Model-Driven Architecture (MDA) |
| Business Process Extension Layer (BPXL) | BPMI | BPEL extension for transactions, human workflow, business rules |
| UML Activity Diagrams | OMG | Notation language |
| Workflow Reference Model | Workflow Management Coalition (WfMC) | Architecture |
| XML Process Definition Language (XPDL) | WfMC | Execution language |
| Workflow API (WAPI) | WfMC | Administration and monitoring, human interaction, system interaction |
| Workflow XML (WfXML) | WfMC | Choreography (or similar to it) |
| Business Process Definition Metamodel (BPDM) | OMG | Execution language and/or notation language, as MDA metamodel |
| Business Process Runtime Interface (BPRI) | OMG | Administration and monitoring, human interaction, system interaction, as MDA metamodel |

IRMOS Workflow Language

- Designed our own language and enactment engine
 - Simplicity
 - Speed
 - Extensibility
- Loosely based on BPEL
- Contains basic constructs such as:
Invoke, Sequence, Flow, Wait, While

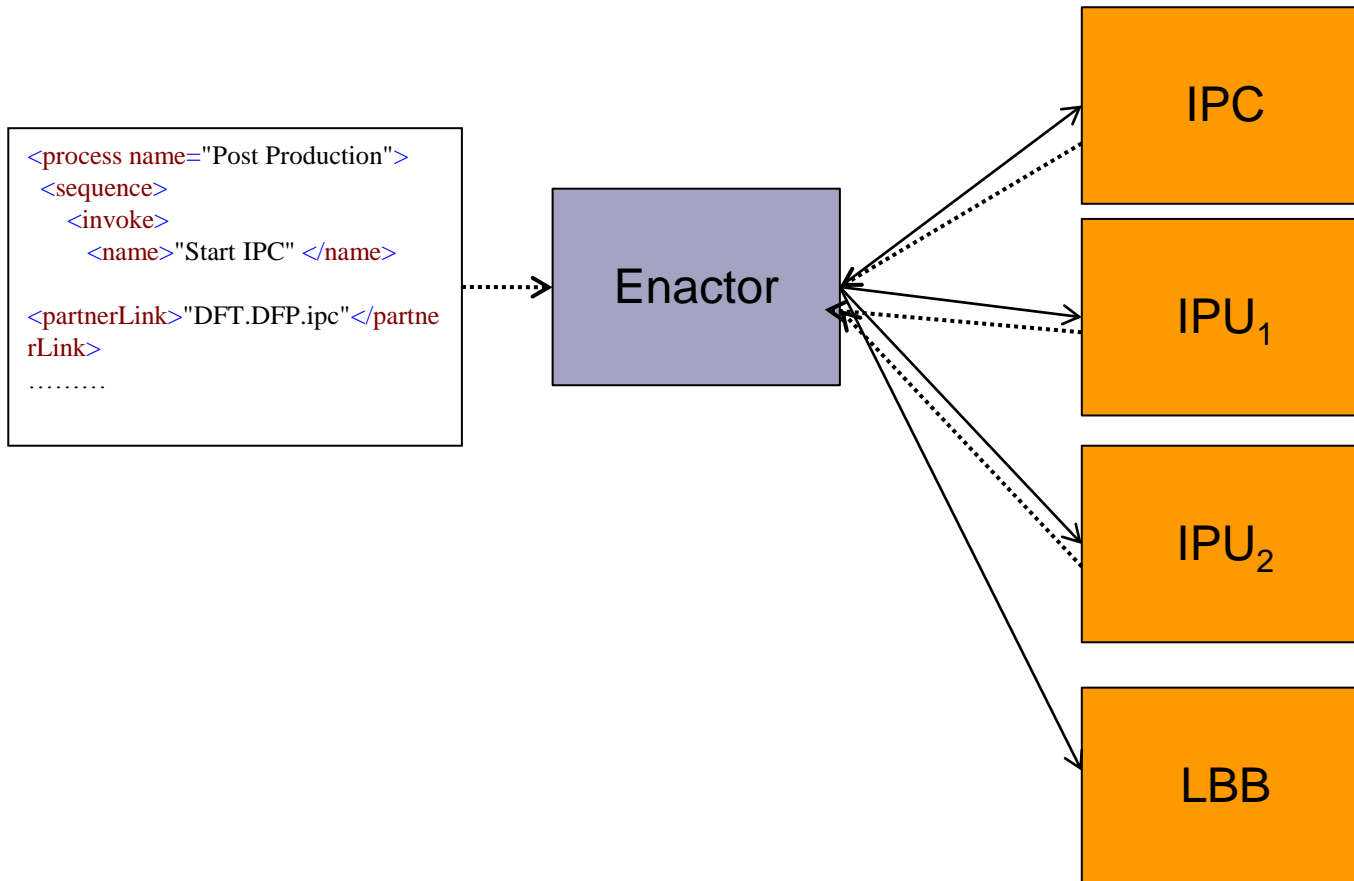
Example of Workflow description



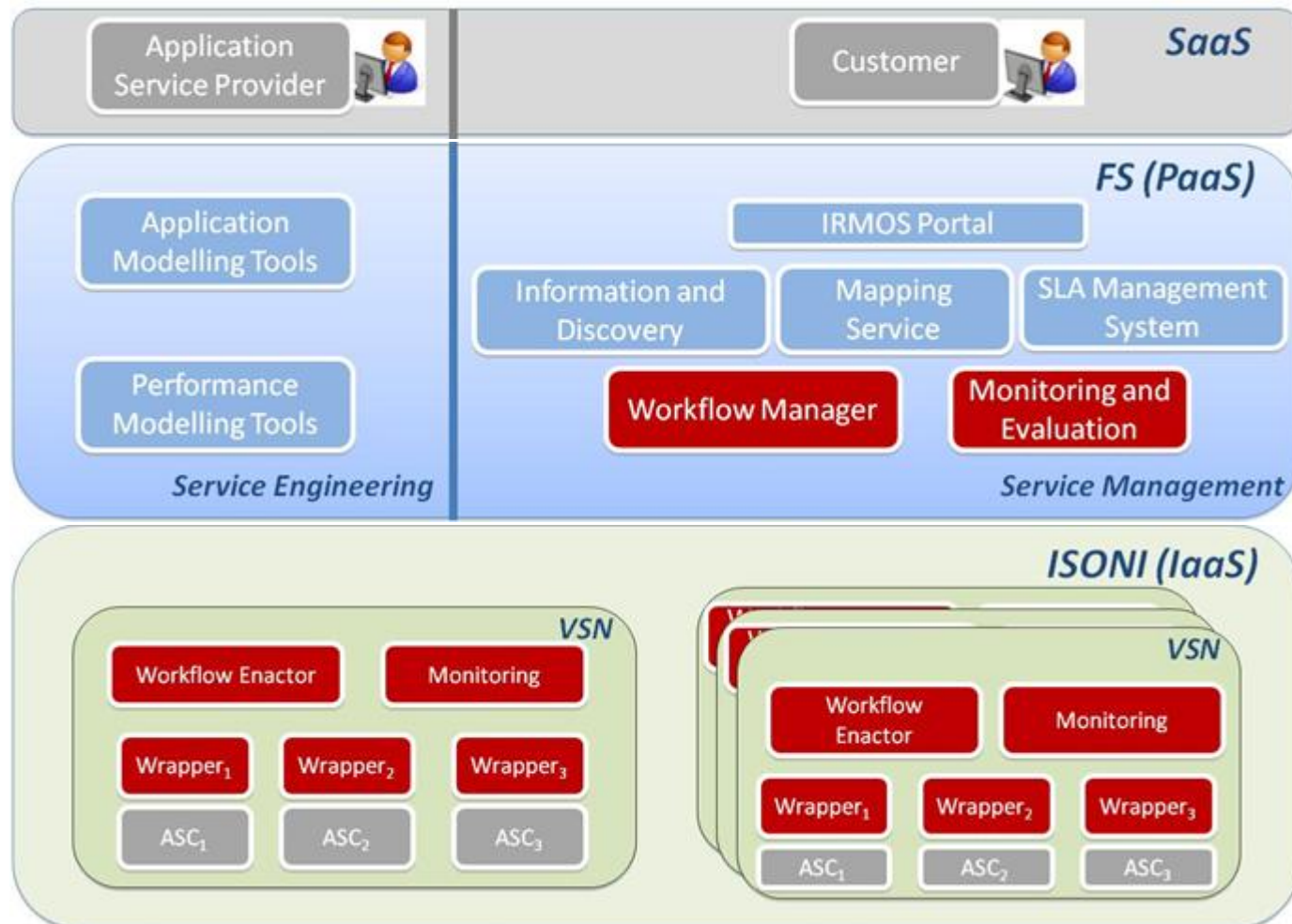
Enactment

- Second phase of the workflow lifecycle
- Enactment of different Application Service Components based on the workflow description

Usual Workflow Enactment



IRMOS Architecture



SOA Phases

□ 3 distinct phases

■ Publication

- The application provider uses the modelling tools to create the application

■ Negotiation

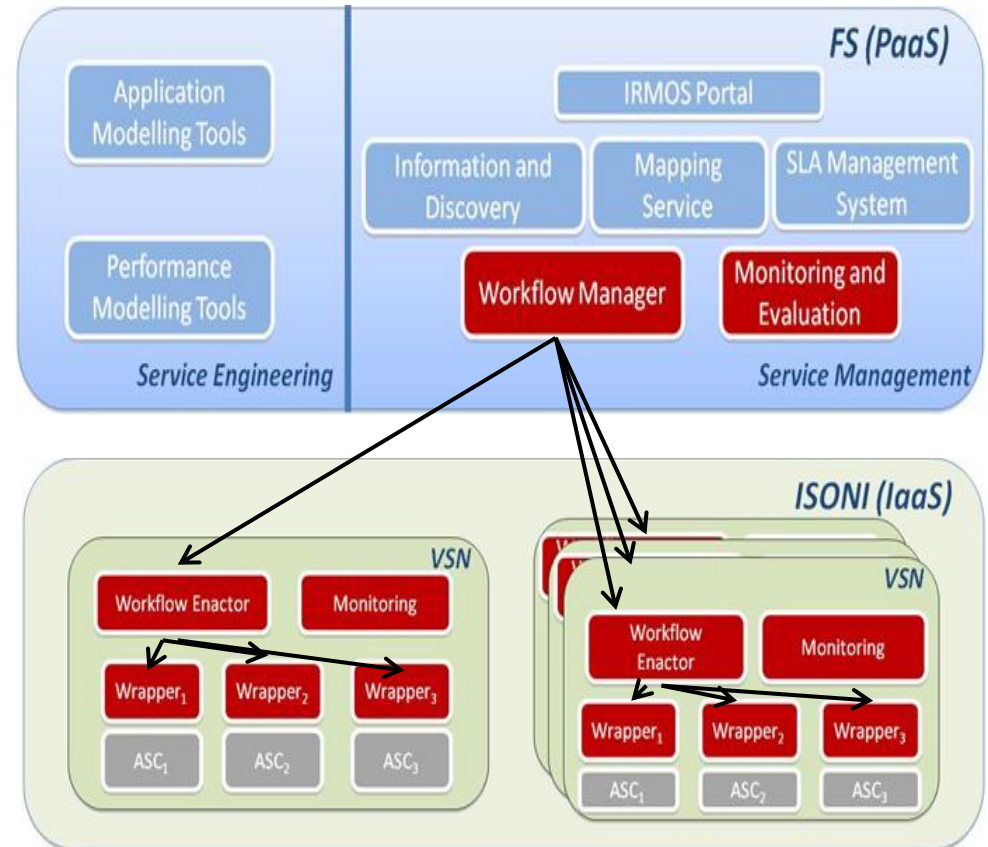
- The application provider negotiates with IRMOS the resources for the application and signs SLAs

■ Execution

- The user executes the application

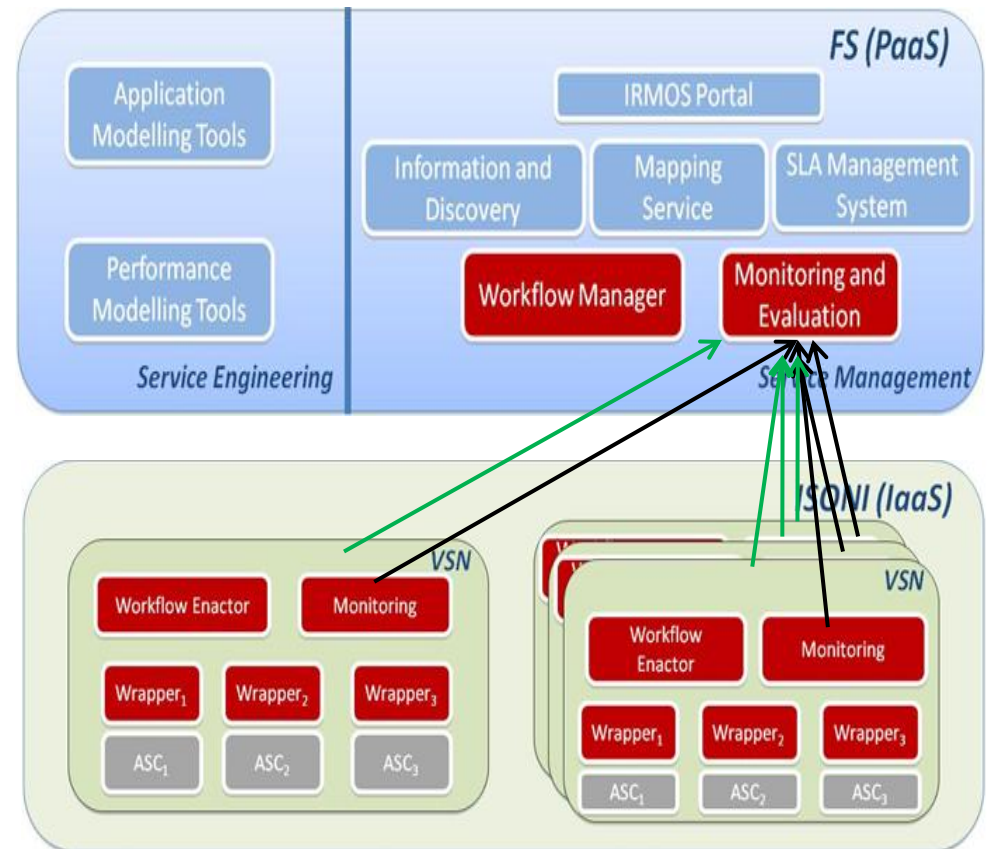
Workflow Management in IRMOS

- Hierarchical
 - Workflow Manager oversees multiple Workflow Enactors
- Part of the systems within VSN
 - Treated as any other ASC, therefore resources are provided as needed
- Ability to enact legacy code – non WS applications through the Wrapper Service



Monitoring and Evaluation

- ▣ Aggregation of info from multiple sources
- ▣ Evaluation of monitoring data against expected QoS. SLA violations may occur
- ▣ Applications can raise events of their own. These are evaluated by the platform and necessary action can be taken.



Conclusions

- ❑ Provide the ability to model an application as a workflow
- ❑ Execute a workflow
- ❑ Take into consideration the QoS needs of platform services
- ❑ Monitoring both on application and on infrastructure level
- ❑ Evaluation of events from various sources



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Thank you!

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