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ANSA Phase III

TC Presentation - FTF for Dependable Workflows

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Abstract

This document contains a slide presentation on APM.1217.00.03, “A Flexible Transaction Framework for Dependable Workflows. The work is in part fulfilment of deliverable D2 (Programming Model for Dependability).

APM.1217.00.03 scopes the applicability of dependable workflow management and the requirements of the supporting infrastructure. It provides a foundation for detailed design of specific workflow management systems. Accordingly, the document is targeted mostly at a technical designer audience. Moreover, it is assumed that this audience is familiar with the basic principles and techniques of atomic transactions.

APM.1250.00.03 **Draft** 2 June 1994

Request for Comments (confidential to ANSA consortium for 2 years)

Distribution:
Supersedes:
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Document APM.1217.00.03
(Deliverable in part fulfilment of task D2)
Flexible Transaction Framework for Dependable Workflows

John Warne

Dependability Task group

ANSA TC - 7 June 1994

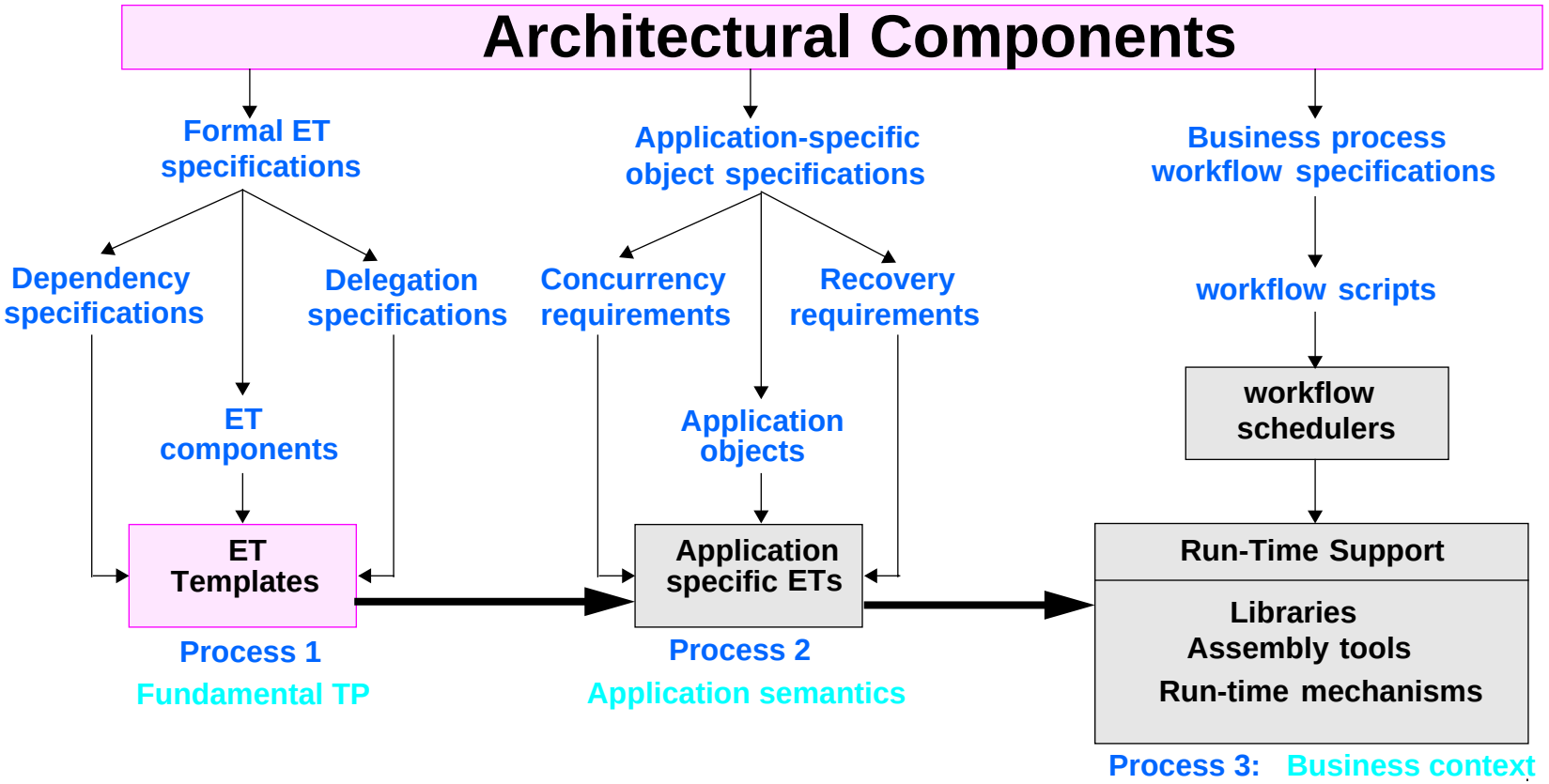
Motivation (Chapter 1)

- **Trend towards an electronic market place**
  - **selling/buying information/services/goods**
- **Need for effective management tools**
  - **construction of business processes/services**
  - **rapid provisioning/change/configuration**
- **Workflow management tools provide a solution**
  - **rule-based supervisory software**
  - **orderly control and monitoring of multiple tasks**
- **Need for dependable workflows**
  - **failure detection with automatic recovery**
- **Need for transaction-based workflows and supporting platform**

Need for Flexible Transactions (Chapter 2)

- **Benefits of traditional ACID transactions**
  - **effective for short computations in competitive environments**
  - **simplifies programming of dependable computations**
  - **acceptable efficiency for many commercial applications**
- **Limitations of traditional ACID transactions**
  - **Lacking in functionality/flexibility/performance for many applications**
  - **ineffective collaborative, and/or long running applications/workflows**
  - **isolation property of ACID too restrictive**
- **Need to relax transaction isolation**
  - **emergence of new extended transaction models**
- **Need for a flexible transaction framework to overcome limitations**

Architectural Summary (Chapter 3)



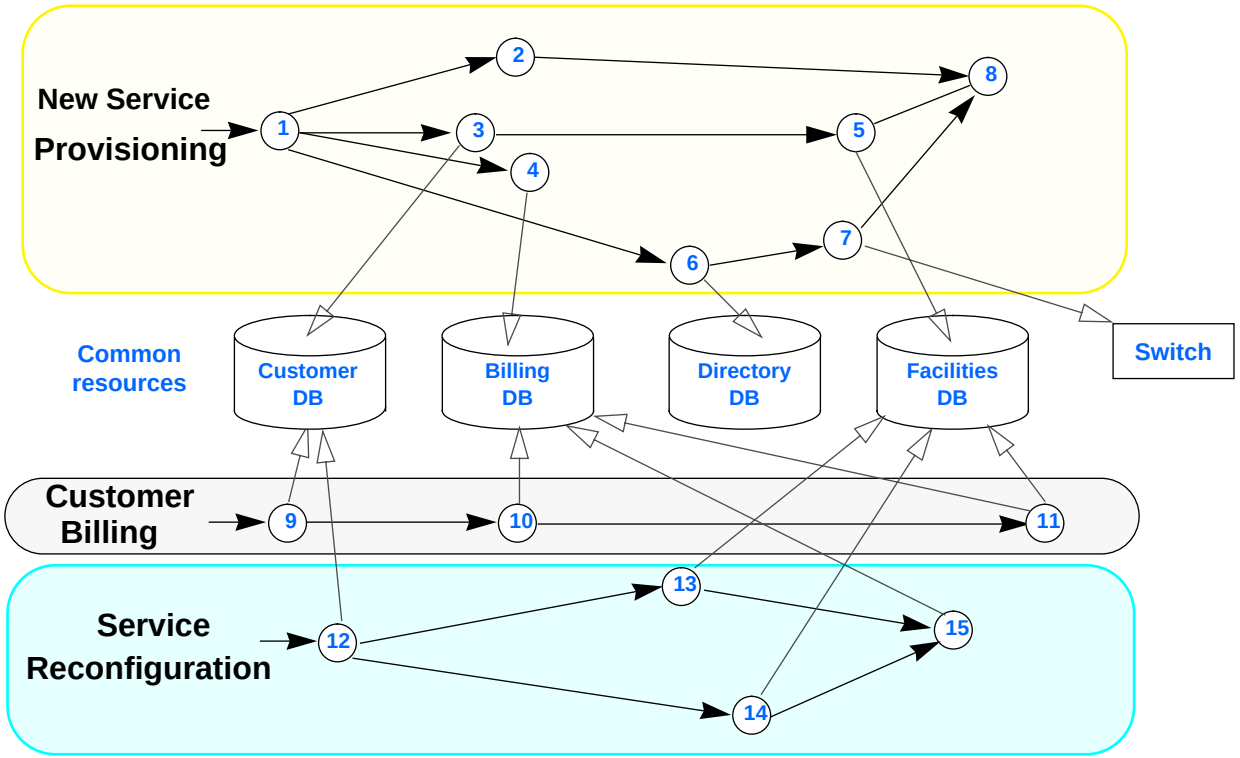
Concepts/Building blocks (Chapter 4)

- **use of ACTA model**
  - **permits formal specification of transaction models**
  - **assists in reasoning about correctness of models**
- **Simple concepts and mechanisms**
  - **inter-transaction dependencies**
  - **object resource delegation**
- **transaction management extensions**
  - **dependency manager**
  - **delegation manager**
- **Use of dependencies and delegation in nested transactions**

Construction Processes (Chapters 5, 6, 7)

- **Process 1: building flexible transaction models (Chapter 5)**
  - **define transaction membership**
  - **define dependencies between members**
  - **define object resource delegation among members**
  - **implement run-time support mechanisms for FTFSE**
- **Process 2: building application-specific flexible transactions (Chapter 6)**
  - **interact with FTFSE**
  - **apply model to application objects**
- **Process 3: building transactional-based workflows (Chapter 7)**
  - **apply process 1 to combine flexible transactions**
  - **apply process 1 to combine workflows**

Workflow Example (Chapter 8)



1 - Collect Customer Data
2 - Work Assignment
3 - Update Customer DB
4 - Update Billing DB
5 - Update Directory DB
6 - Allocate Facilities
7 - Update Switch
8 - Sync. Completion

9 - Access Customer DB
10 - Access Billing DB
11 - Access Facilities/Billing DB
12 - Access Customer DB
13 - Allocate Facilities
14 - Allocate Facilities
15 - Access Billing DB

(i) Task i

→ Task execution order

⇢ Task uses resource

Workflow Scripts + Workflow Tools -> Flexible Efficient Dependable Business Processes

Directions for Future Work

- **Detailed design specification for FTF run-time support, including**
  - **libraries of widely applicable dependency rules**
  - **event-based trigger mechanisms for dependency rule evaluation**
  - **run-time dependency manager**
  - **run-time delegation manager**
  - **integration of above with basic transaction management platform**
- **Detailed design of FTFSE**
  - **graphics/workflow tools**
  - **transformer tools to assist construction processes**
  - **libraries of control mechanisms (e.g. multi-transaction commit coordinators)**