Tentative schedule …

Dates	TOPICS / LECTURES NOTES
March 15,	Web services fundamentals (part II)
	Web services based architectures
March 22	Mobile agent based architectures
	Course evaluation
March 29,	Quiz #2
April 5	Quiz corrections
Same week	Deadline for project report submissions
	Project demos

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Web Services Based Architectures

INSE 7110 – Winter 2005
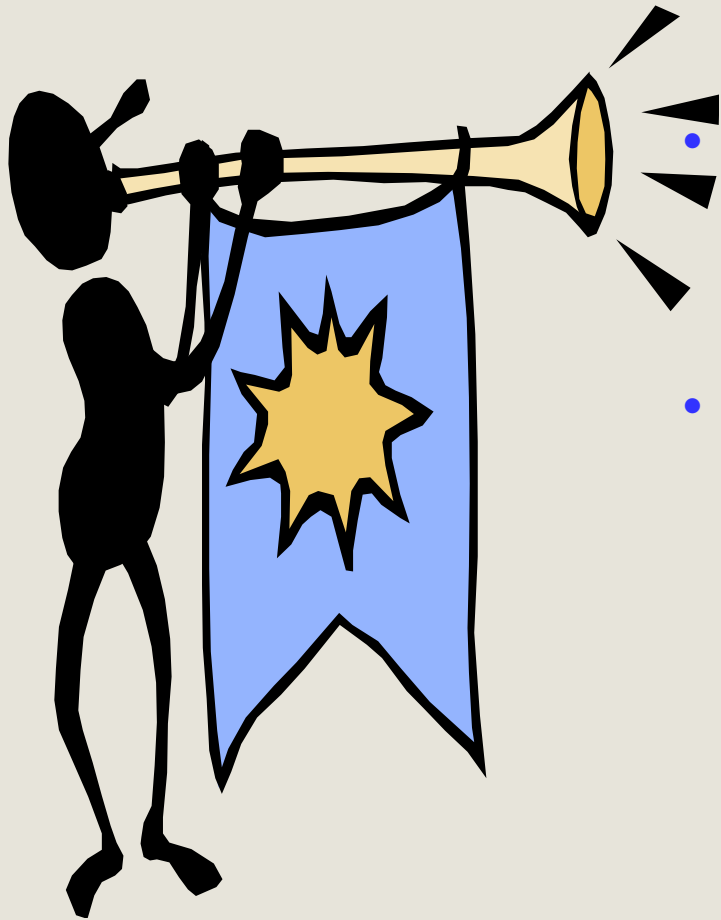**Value Added Services Engineering in Next Generation Networks**
Week #11

Application areas

Any area that requires program to program interactions over a network

Examples

- Value added service engineering in NGN
- Digital imagery
- Geographical information systems

Outline

- **Web services for value added service engineering in NGN**

- **A digression on digital imagery**

Applying Web services to value added service engineering in NGN

1. **Parlay-X**

2. **OMA**

Two issues   …

1. Define Web services for making telecommunications capabilities available to applications in same or foreign domain

- Call control
- Presence
- Location
- Messaging

Two issues …

2 - Enable the use of Web services in telecommunications by providing common / supporting functions such as:
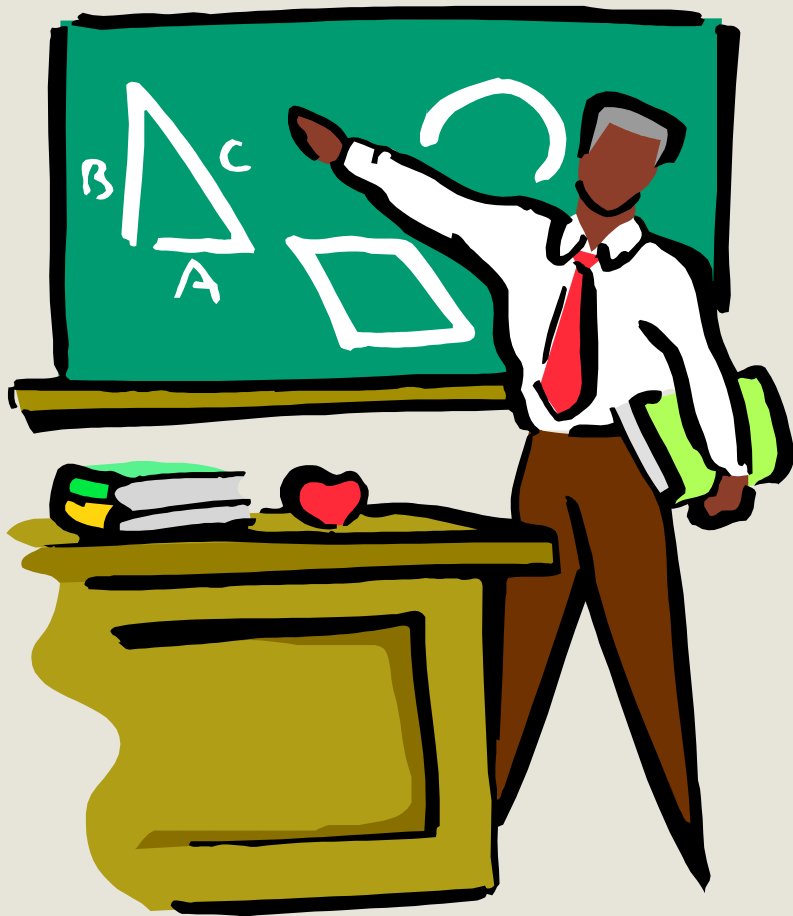
Billing

Security -

- Authentication

- Authorization

- Non repudiation

- Others

Service management

- registration

- Discovery

- Others

Parlay-X …

1. **Introduction**

2. **Architecture**

3. **The services**

Introduction

1. Specifications

Parlay forum

- White paper + actual specifications
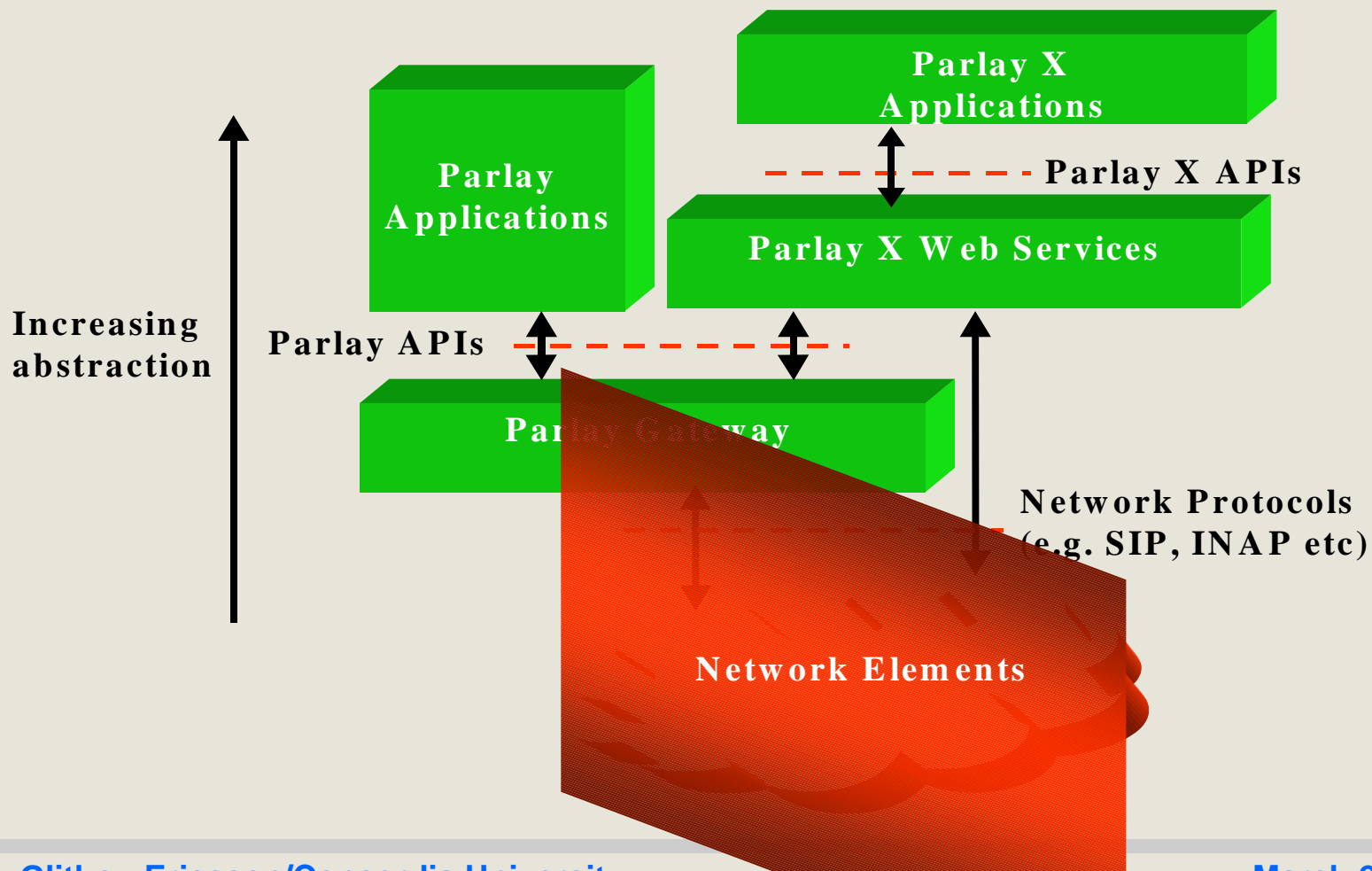- Released as part of Parlay 4.0 specifications

3GPP forum

- Parlay-X Web services for multimedia conference

2. Application interfaces

- Focus: First issue
- Aim at covering all telecommunication capabilities
  - Stand alone capabilities (e.g. presence, call control)
  - Combined capabilities (presence + call control)

3. Use the reference Web service principles (e.g. coarse grained) technologies (e.g. WSDL)

Architecture

Parlay X Applications

Parlay Applications

Parlay X APIs

Parlay X Web Services

Increasing abstraction

Parlay APIs

Parlay Gateway

Network Protocols (e.g. SIP, INAP etc)

Network Elements

The services

1. **Call control**
2. **Conferencing**
2. **Messaging**
   - SMS
   - MMS

3. Payment (e.g. volume charging)

4. Account management (e.g. account credit expiration date query)

5. User status (online / offline)

6. Terminal location

Parlay-X Call Control …

Make a call

Get call information

End call

Cancel call request

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Parlay-X Call Control …

Handle busy

Handle Not reachable

Handle No answer

Handle off Hook

Parlay-X Conferencing - Basics

- Allows the creation of a multimedia conference call
- Allows the dynamic management of:
  - Conference
  - Participants
  - Media

- Service model entities
  - Conference: a "context" to which participants can be added
  - Participant: parties involved in the conference
  - Media: audio/video/chat

Parlay-X - Conference management

"createConference":
- Create a multimedia conference with initially no participant

"getConferenceInfo"
- Gets information concerning the current status (initial, active, terminated) of the conference

"endConference"
- Three possibilities:
  - Maximum duration of the conference expired
  - All participants have left the conference
  - The conference owner has left the conference

Parlay-X - Participant management

"inviteParticipant":
- Add a new participant to the conference
- The operation fails if the maximum participants umber has been reached

"disconnectParticipant":
- Disconnects the participant

"getParticipantInfo"
- Gets information concerning the current status (invited, connected, disconnected) of the participant

"getParticipants"
- Gets information concerning the current status of each participant

Parlay-X - Media management

"addMediaForParticipant":
- Executed on a single participant
- Add a media stream to the media set used by participant
- The new media has to be compatible with:
  - The conference type
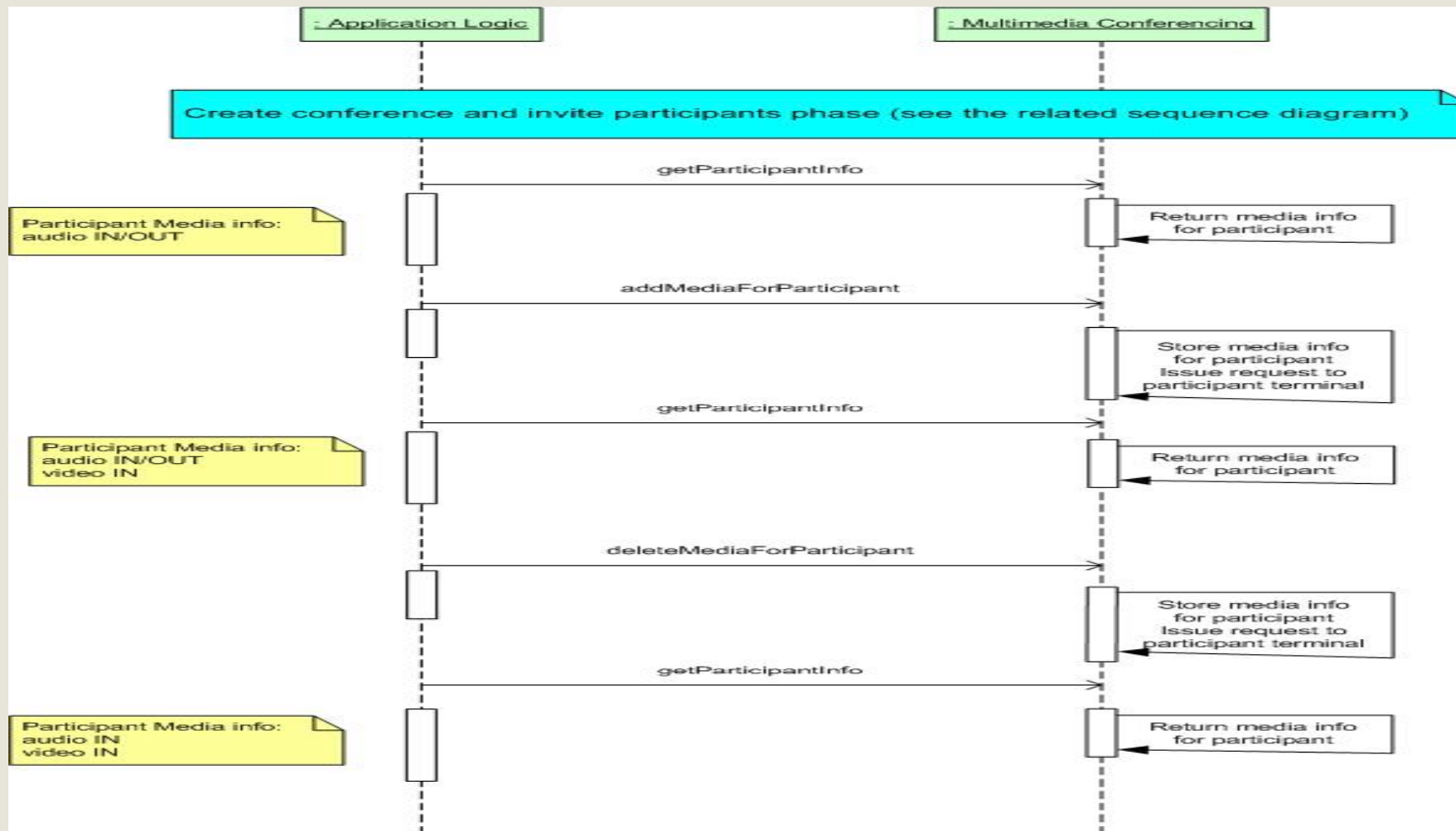 - The media suported by the participant terminal

"deleteMediaForParticipant":
- Executed on a single participant
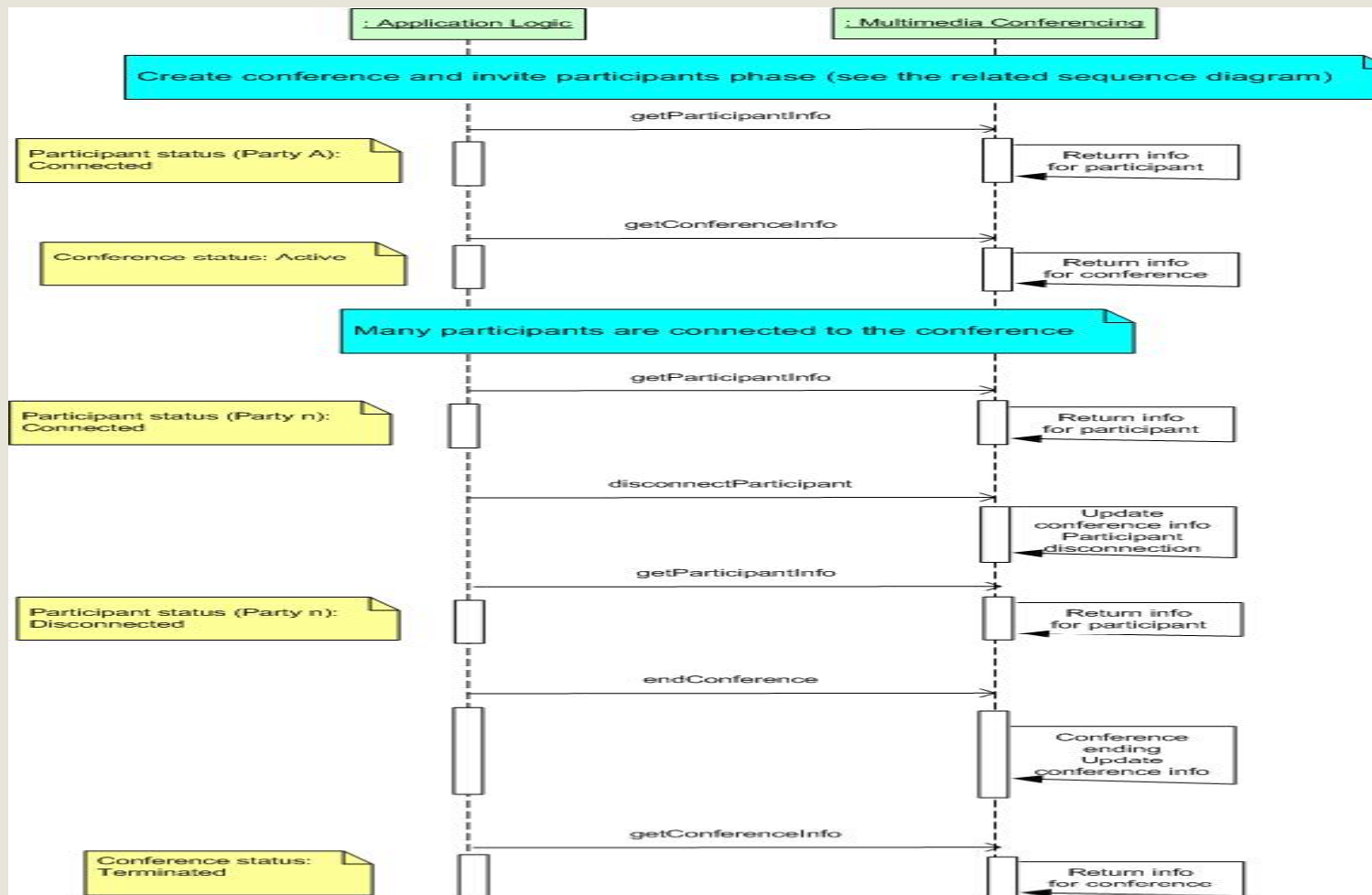- Add a media stream to the media set used by participant

Parlay-X – Sequence diagrams …
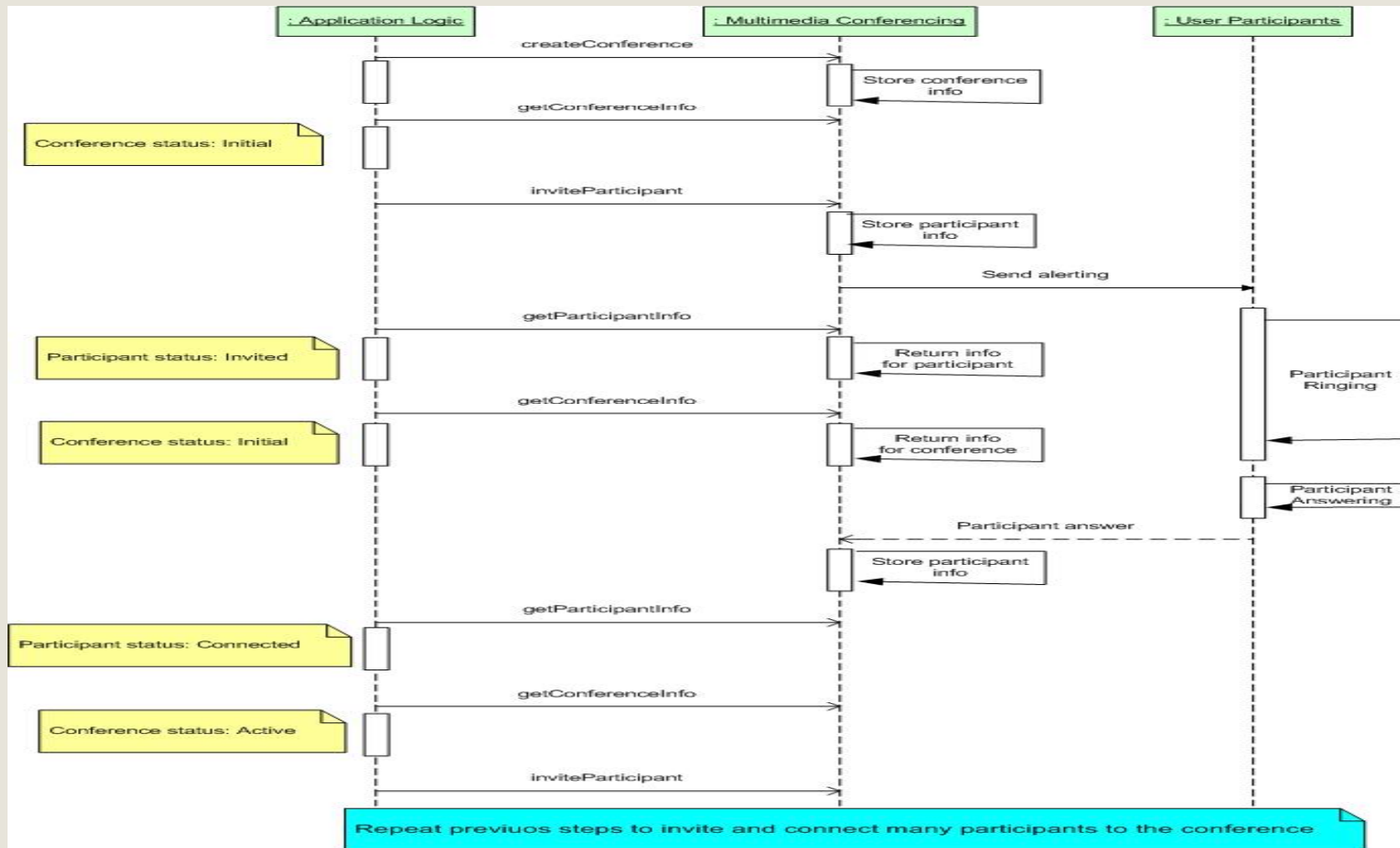
Parlay-X – Sequence diagrams …

Parlay-X – Sequence diagrams …

Parlay-X MMS …

Send Message

Get Message Delivery Status

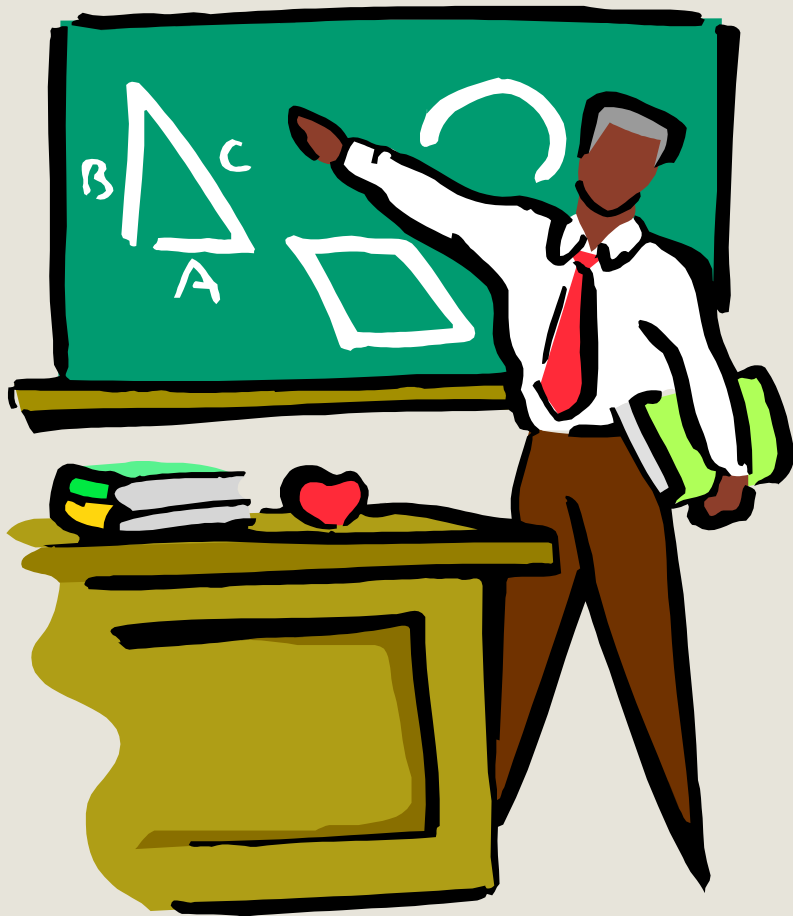Get Received messages

Get messages URIs

Notify message reception

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OMA ...

1. **Introduction**

2. **Architecture (ARCH)**

3. **OMA Web Service Enabler (OWSER)**

Introduction

OMA

- Industry association created in 2002

- Focus on mobile services

- Aims at:

  - Consolidating standards for wireless services (e.g. 3GPP/PP2, IETF, W3C)

  - Producing new standards if needed-

  - Tackling the two issues

Architecture

Aim at providing a general architecture for mobile services

- Requirements

- Principles

- Functional entities

- Common framework

- Service adaptability

Principles

- Signalling protocol neutrality and independence from programming languages, operating systems and so on

- Leverage existing standards

- Interoperability, scalability

- Service adaptability

- Consistency with Internet models

OMA Web service enabler (OWSER)

Aim at providing solutions to common problems faced by designers when using Web services in an OMA environment

- Practical deployment patterns

- Common functions (e.g. charging, security)

- Network Identity specifications (I.e. specific aspects of security – Based on Liberty alliance specifications)

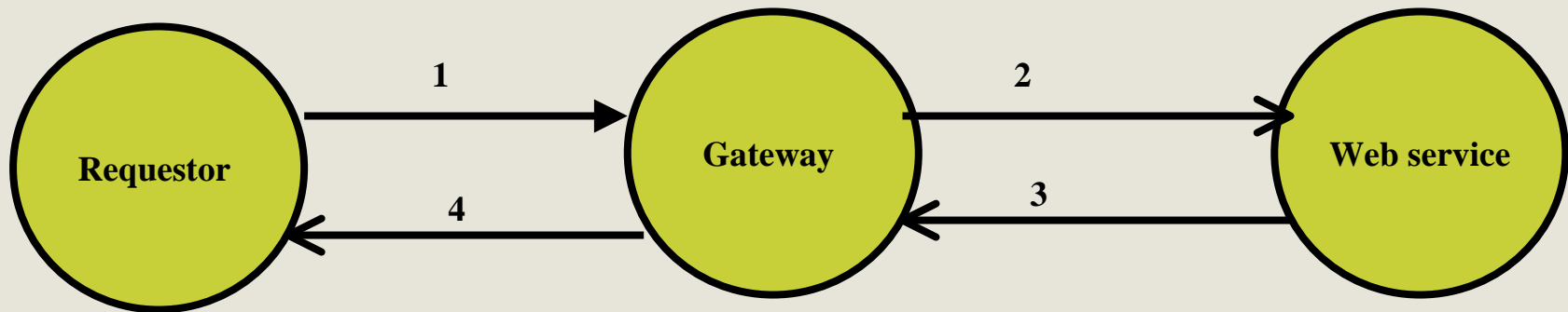- WSDL Style guidelines

- Test requirements

Examples of deployment patterns
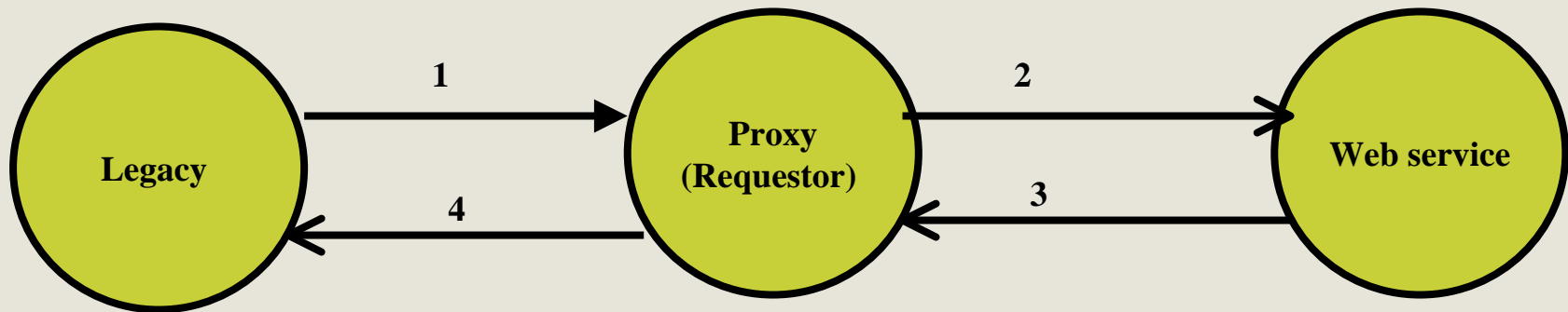
The adapter pattern
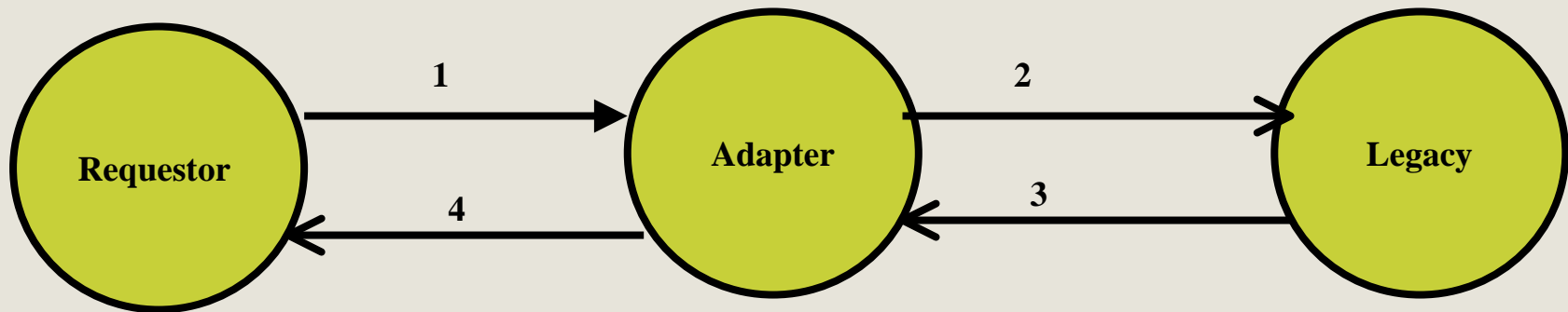
Examples of deployment patterns
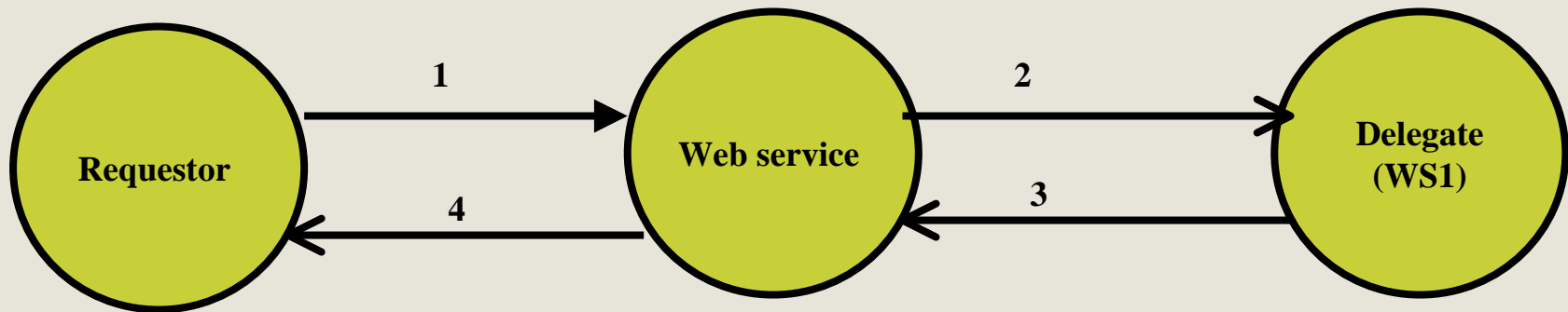
The gateway pattern

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Examples of deployment patterns
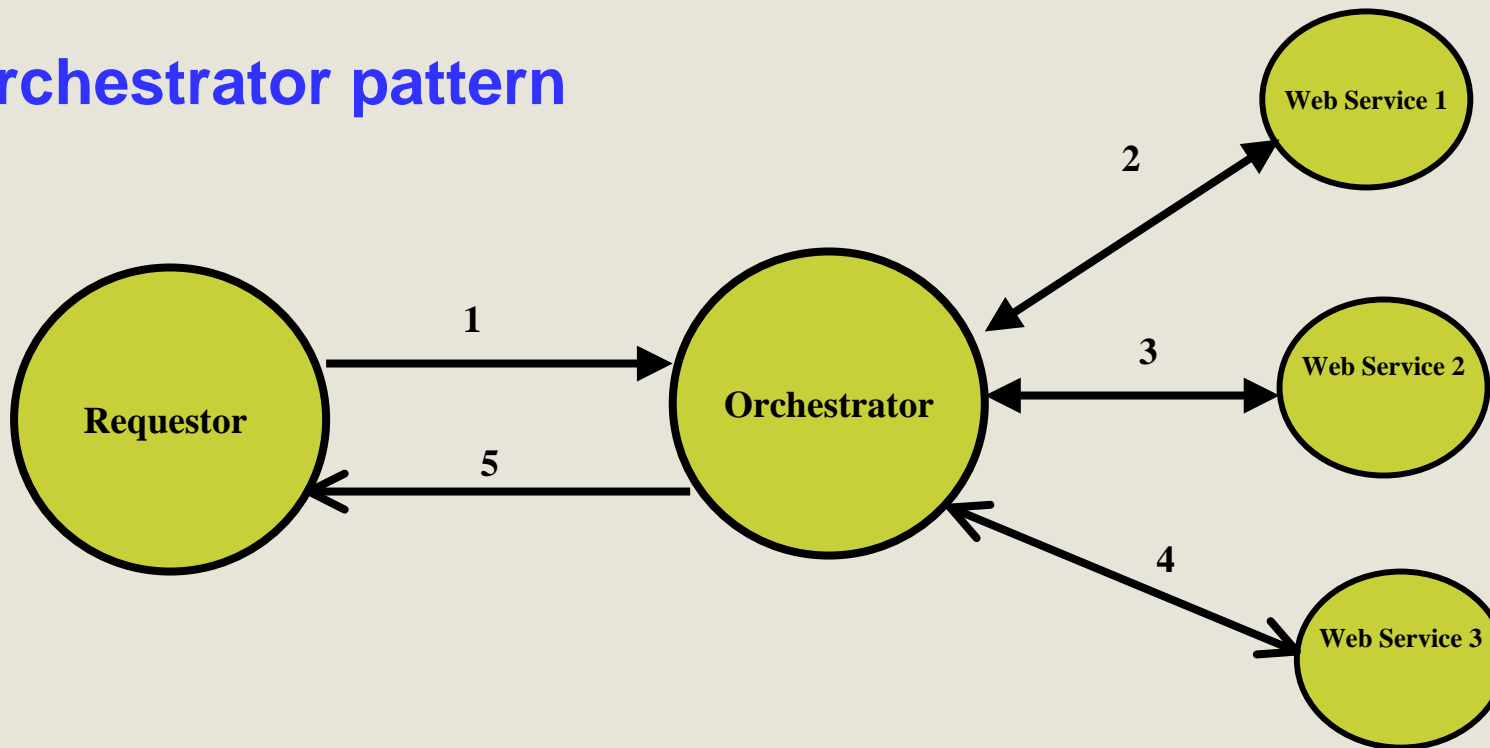
The proxy pattern

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Examples of deployment patterns
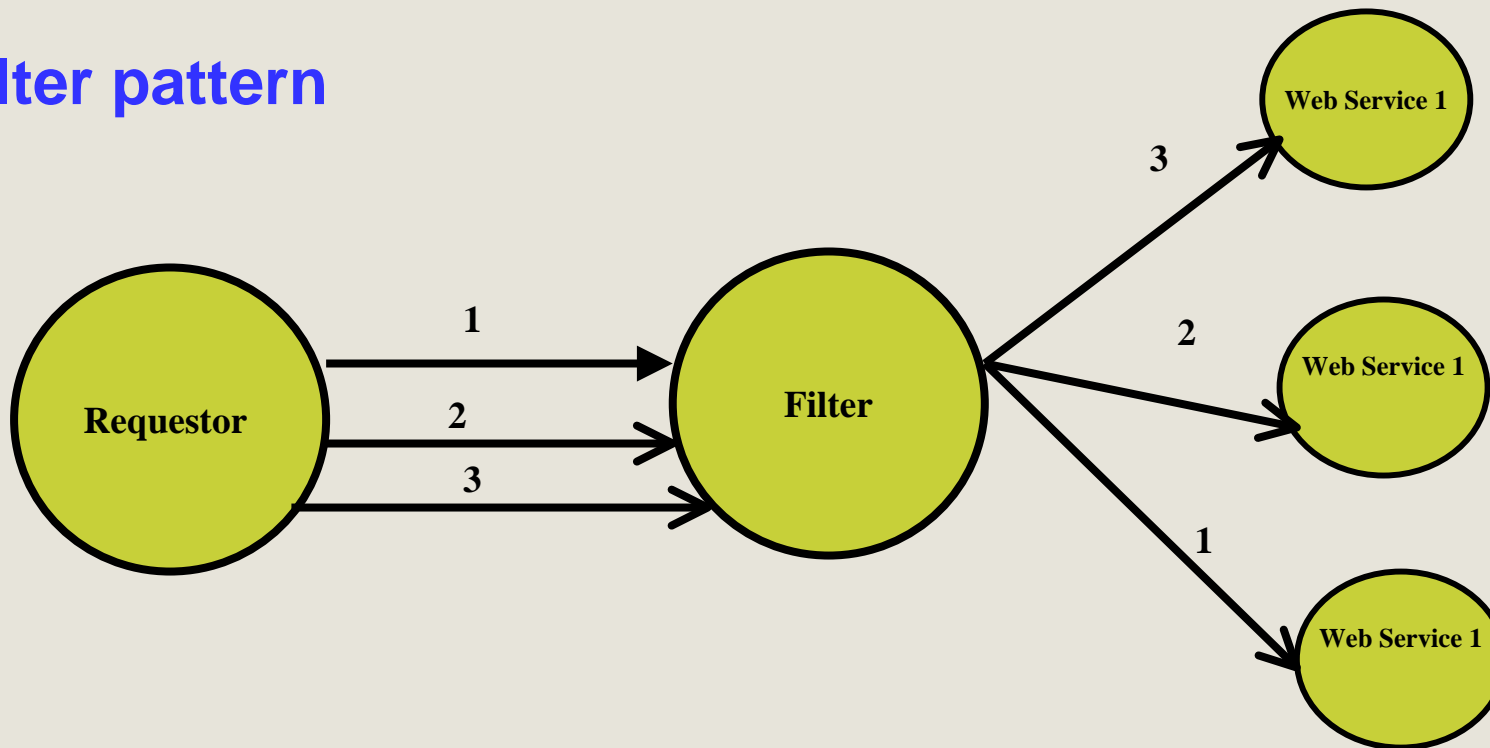
The delegate pattern

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Examples of deployment patterns

The orchestrator pattern
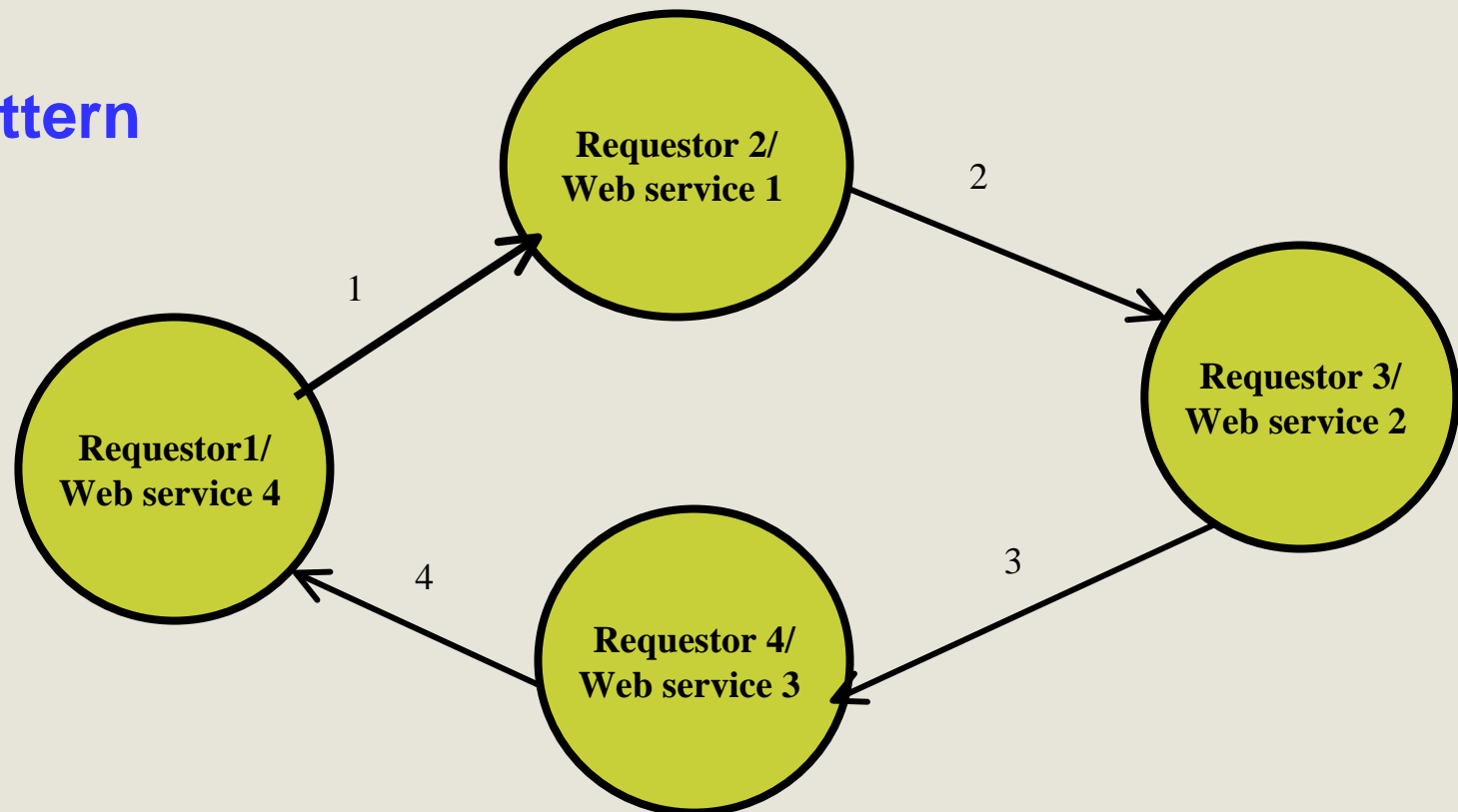
Examples of deployment patterns

The filter pattern

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Examples of deployment patterns

The workflow pattern

Common functions

Common functions are key to interoperability

Common supporting technologies

- XML 1.0
- SOAP 1.0
- WSDL 1.1
- HTTP 1.1
- UDDI 2.0X
- Use of WS-I profile

.

Common functions

Common functions are key to interoperability

Security (Identification of relevant standards and normative security technologies)

- Authentication
- Data integrity
- Confidentiality
- Key management
- Access control / authorization
- Non repudiation

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Common functions

Common functions are key to interoperability

Service management (Identification of specific versions of UDDI)

- Registration
- Publication
- Discovery

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A quick assessment

1. **Parlay-X Web services**
   - True Web services
     - Coarse grained approach (unlike WSDL version of Parlay specifications)
   - Work done "independently" of OMA
     - Situation is evolving (e.g. joint meetings are planned)

2. **OMA**
   - Tackle critical issues such as common functions
   - Integration of existing standards may take longer than planned

A Digression on Digital Imagery …
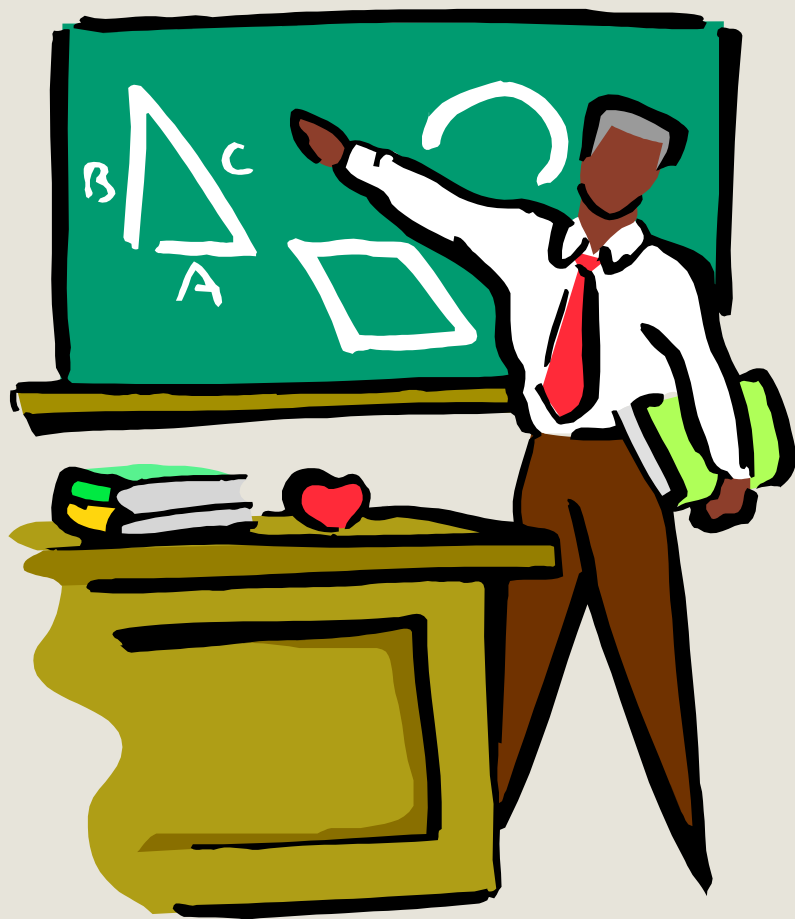
1. **Introduction**

2. **Business model**

3. **Examples of interactions**

Introduction …

Common Picture Exchange (CPXe)

Purpose

- Automation of manipulation, printing and sharing digital images
    - Printing options (in-store pick up, postal delivery

Involved companies

- Most companies active in the digital imaging industry (e.g Kodak, HP, Konica, Olympus and others)
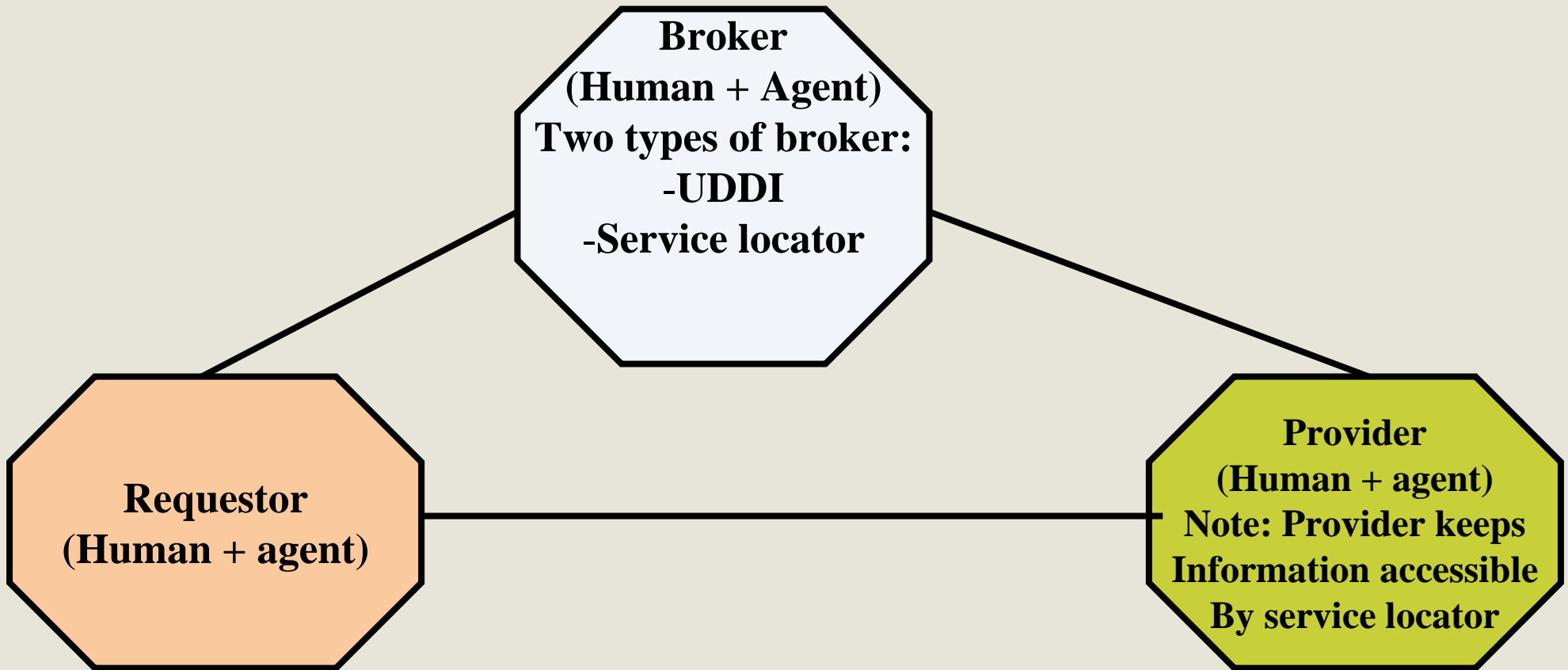
Business model ...

Changes to the original Web service model

- Motivation:
    - UDDI does not provide the level of fine granularity required by the industry
        - Where to get poster size glossy print in a given city
        - Located at a given distance from an hotel
        - With given opening hours

- Changes
    - Possibility to give much lower level granularity about services
    - Possibility for searching such type of information

Business model

Broker
(Human + Agent)
Two types of broker:
-UDDI
-Service locator

Requestor
(Human + agent)

Provider
(Human + agent)
Note: Provider keeps
Information accessible
By service locator

Business model …

Service locators

- Interact (on behalf of service requestor with UDDI and/or catalogues to find service(s) meeting specific criteria
- May be deployed by providers to direct to her/his services
- May be deployed by an independent party
- Accessible via a standardized API

- Catalogues
    - Standardized way for service providers to provide more details about their services (e.g. closing hours of an outlet)
    - Kept in service provider domain
    - Accessible via a standardized API by:
        - Service requestors
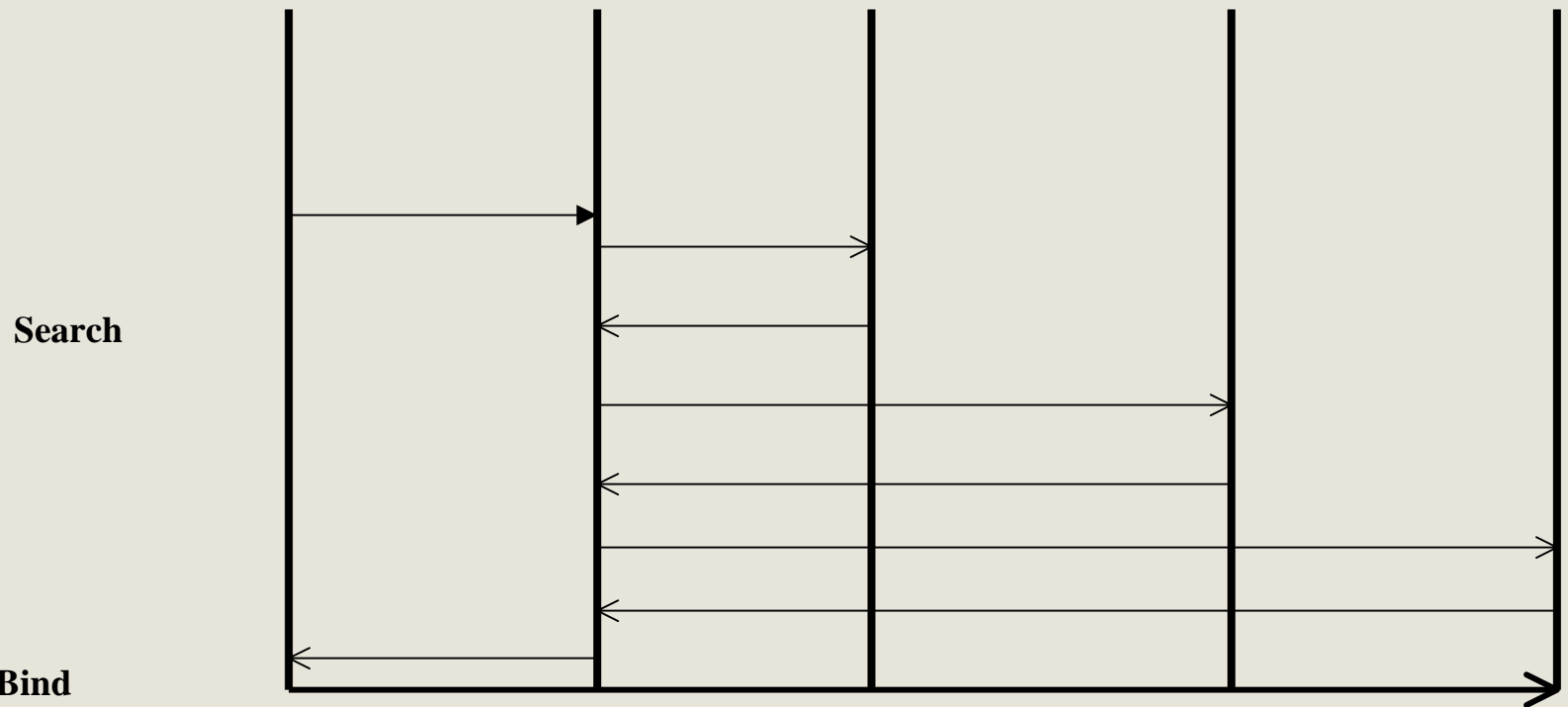   - Service locators

Business model …

Catalogues (Examples of info)

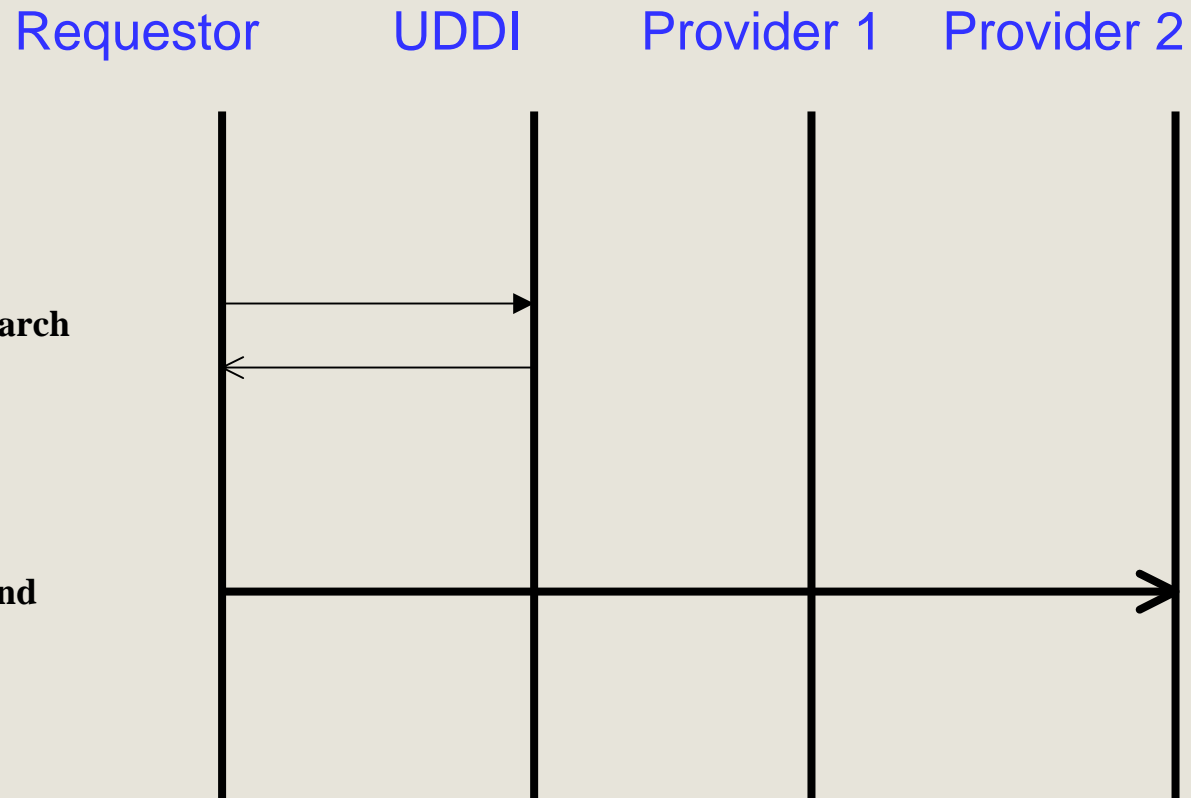- Service property list
- Store list
    - Street address
    - Hours of operations
- Product list
- Price list
- Category list

Examples of interactions …

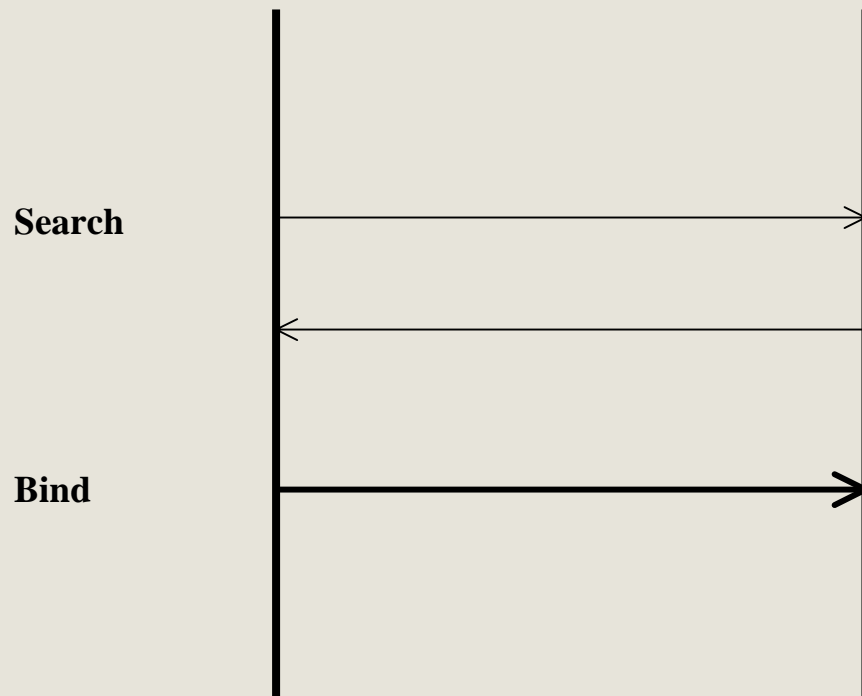Requestor   Locator   UDDI   Provider 1   Provider 2

Search

Bind

Examples of interactions …

Requestor   UDDI   Provider 1   Provider 2

Search

Bind

Examples of interactions …

Requestor   Provider 1

Search

Bind

To probe further   ...

- **Parlay-X**
    - **[1]   Parlay 4.0: Parlay X Web services specification: The Parlay Group Recommendation 09 May 2003. http://www.parlay.org/specs/index.asp, The Parlay Group.**
    - **[2]   Parlay X Web Services; Part 12: Multimedia Conference specification (TS 29.199-12): 3GPP Recommendation 23 September 2004. http://www.3gpp.org/ftp/Specs/html-info/29199-12.htm, Third Generation Partnership Project.**

- OMA
    - http://www.openmobilealliance.org/

    Digital imagery

    T. Thomson et al., CPXe: Web services for Internet Imaging, IEEE Computer Magazine, October 2003