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Jopera
Process Support for Web Services

RESERVOIR

RESTful Web Services vs. Big Web Services: Making the Right Architectural Decision

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http://soadecisions.org

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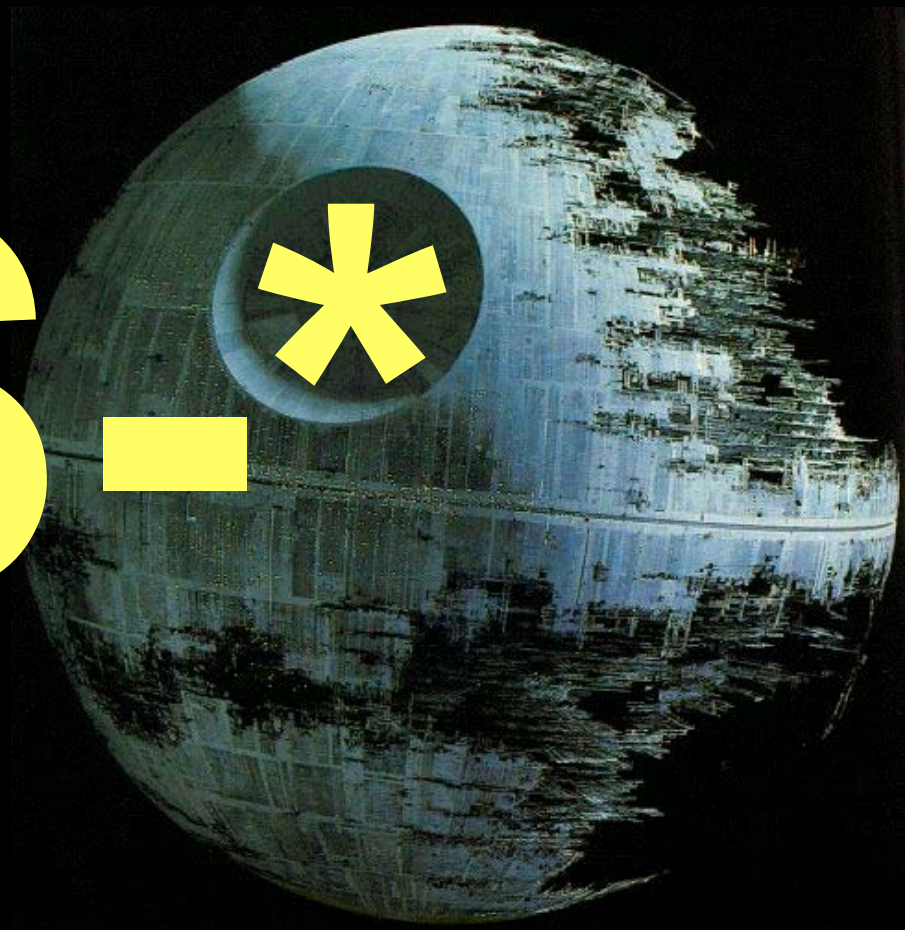
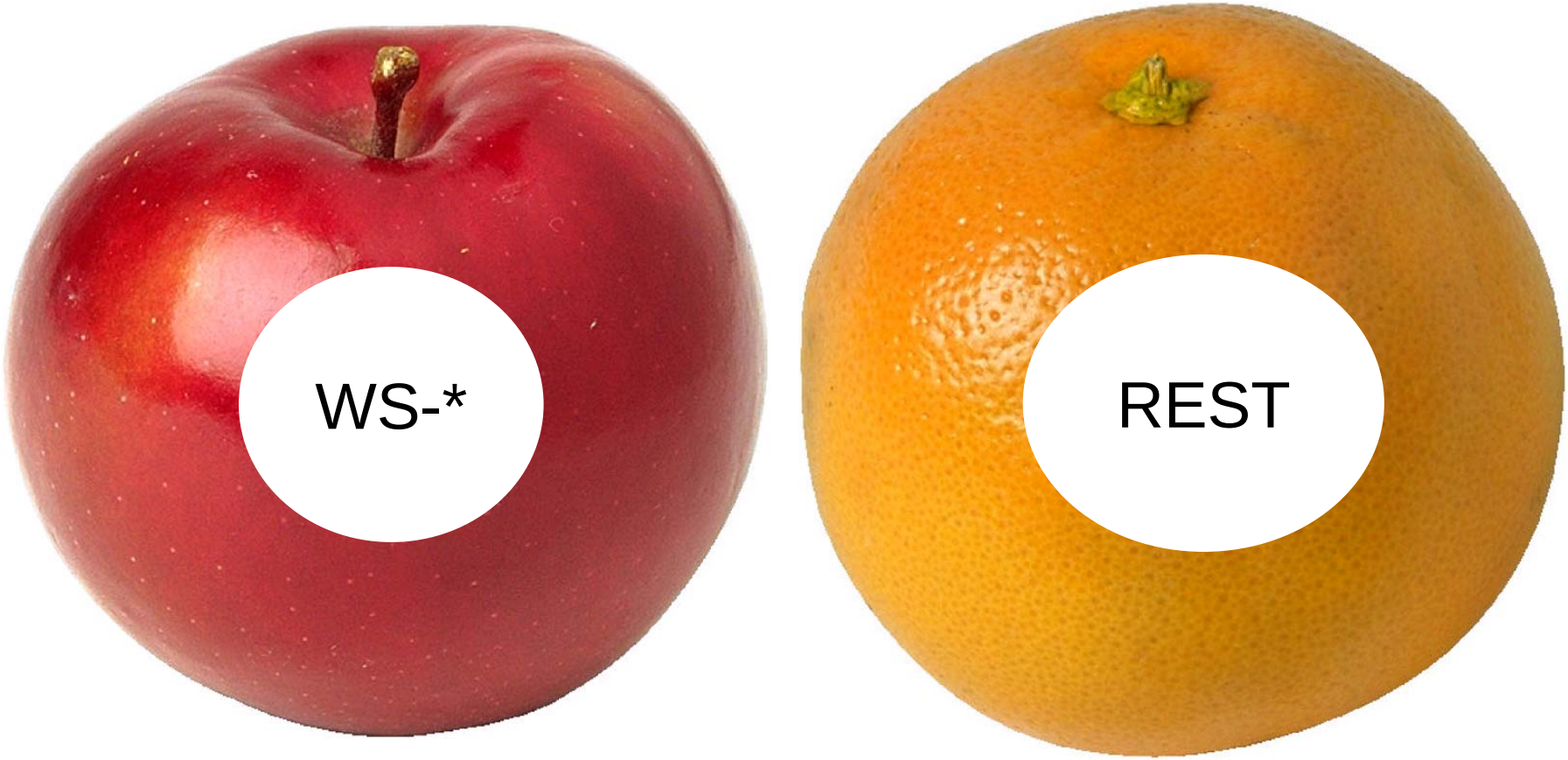
The only religious quote

WS-*



http://www.loudthinking.com/arc/000585.html

Can we really compare WS-* vs. REST?



Can we really compare WS-* vs. REST?

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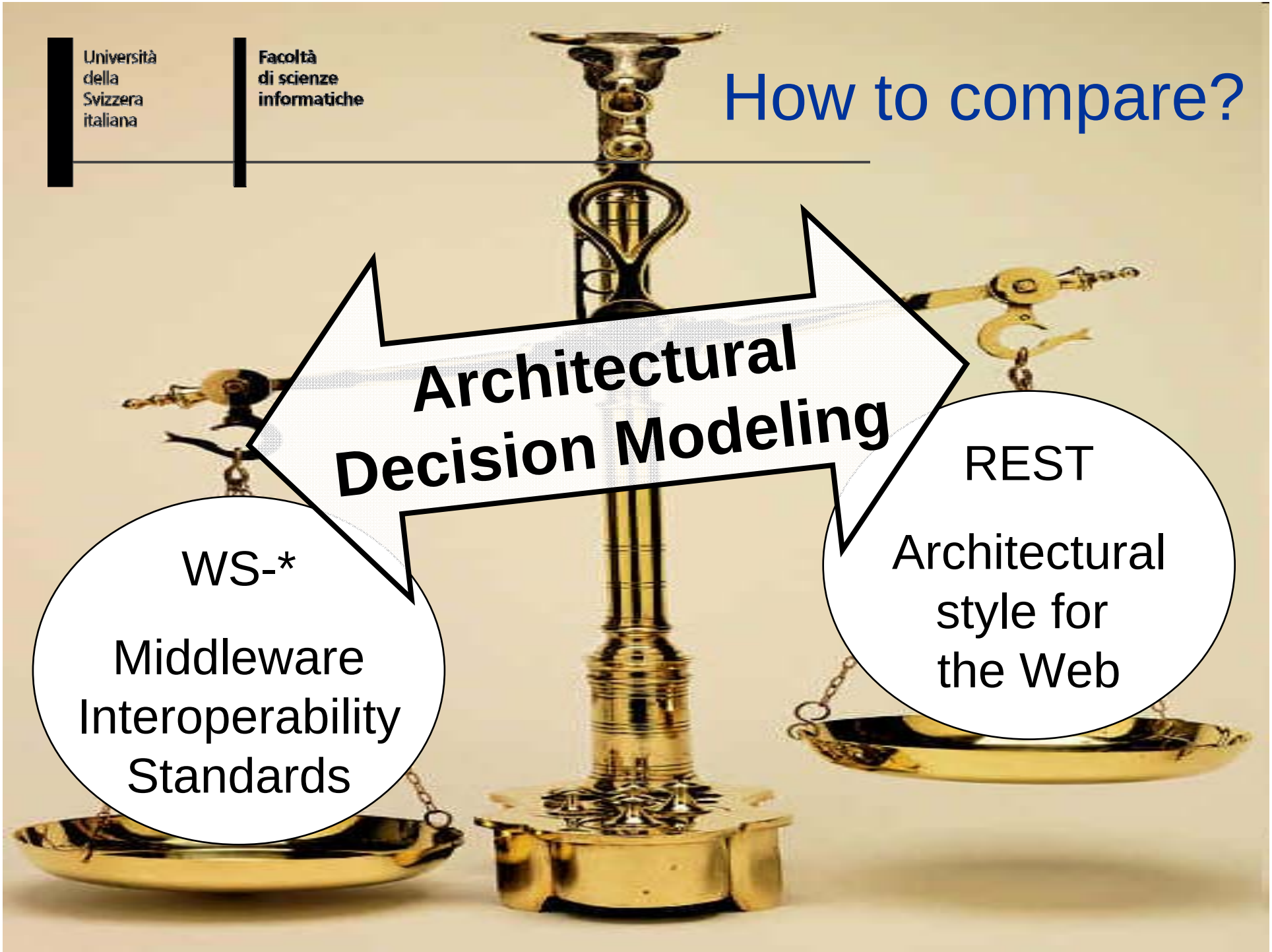
How to compare?



Architectural Decisions

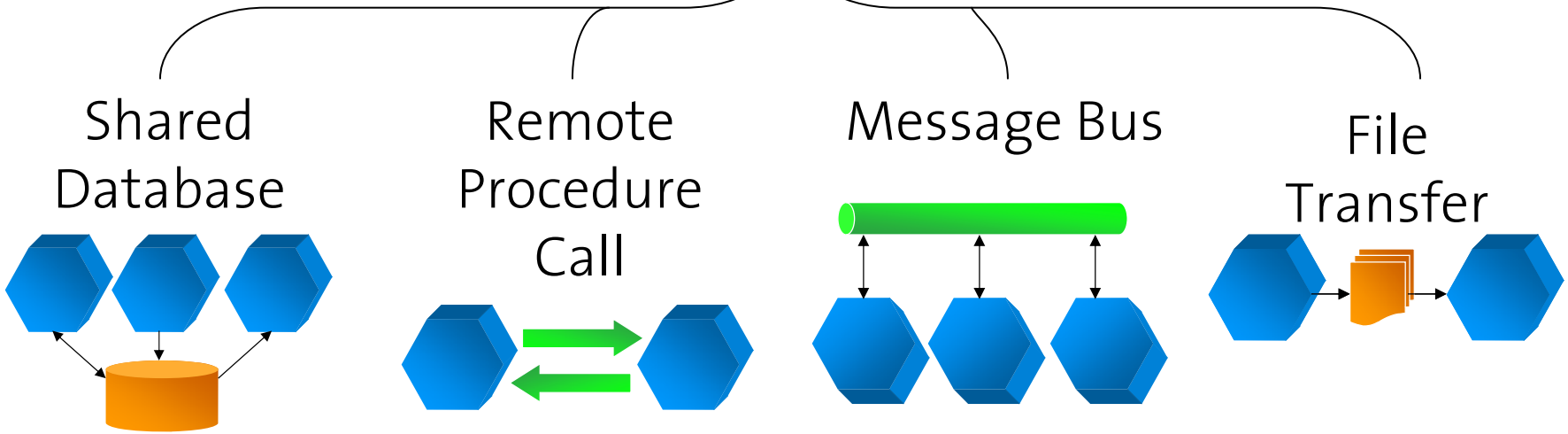
- Architectural decisions capture the main design issues and the rationale behind a chosen technical solution
- **The choice between REST vs. WS-* is an important architectural decision for integration projects**
- **Architectural decisions affect one another**

Architectural Decision:
Communication Protocol

Architecture Alternatives:
1. **TCP**
2. **SMTP**
3. **HTTP**
4. **MQ**
5. **BEEP**
6. **CORBA IIOP**
7. **…**

Rationale

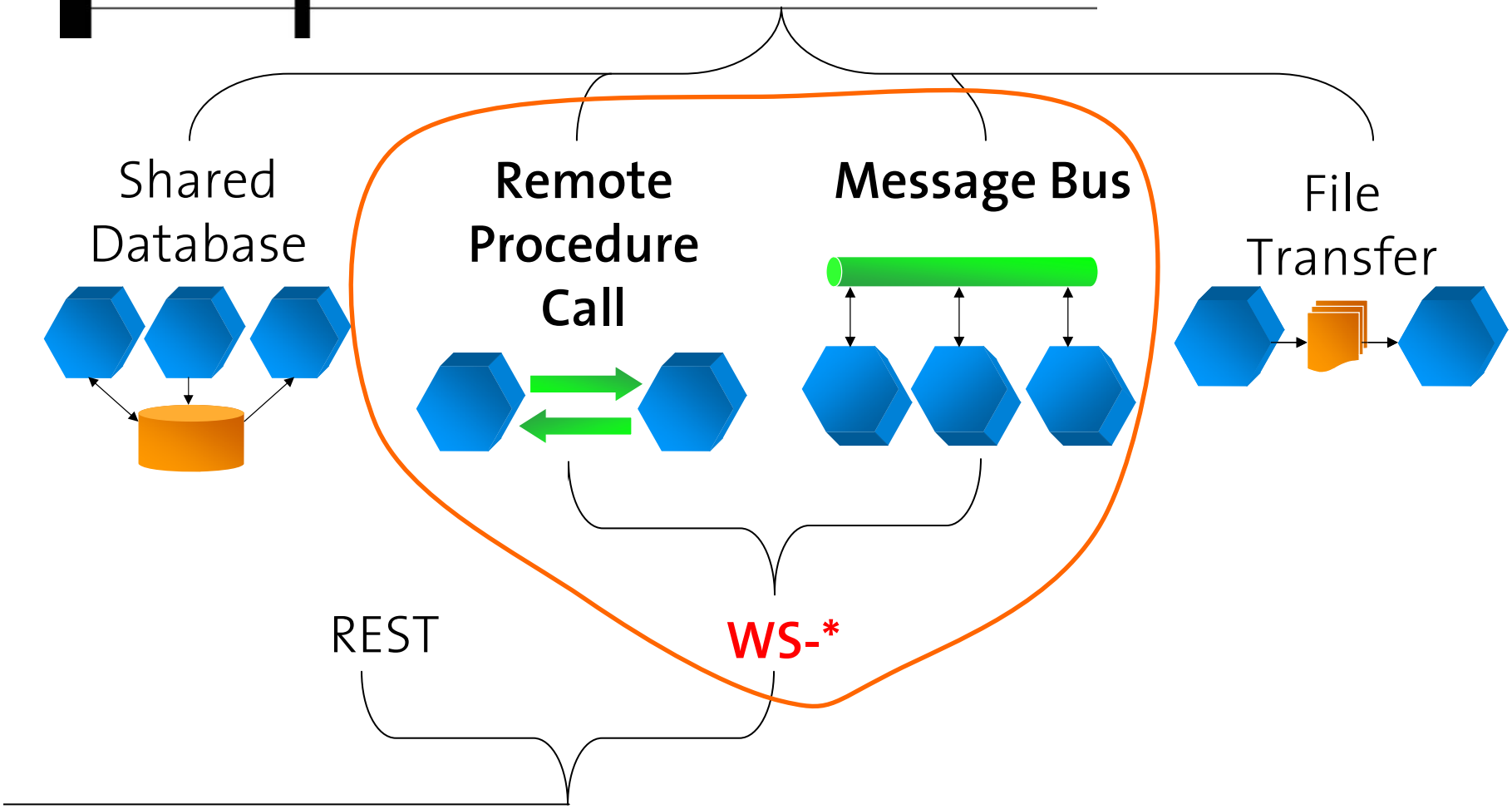
Application Integration Styles



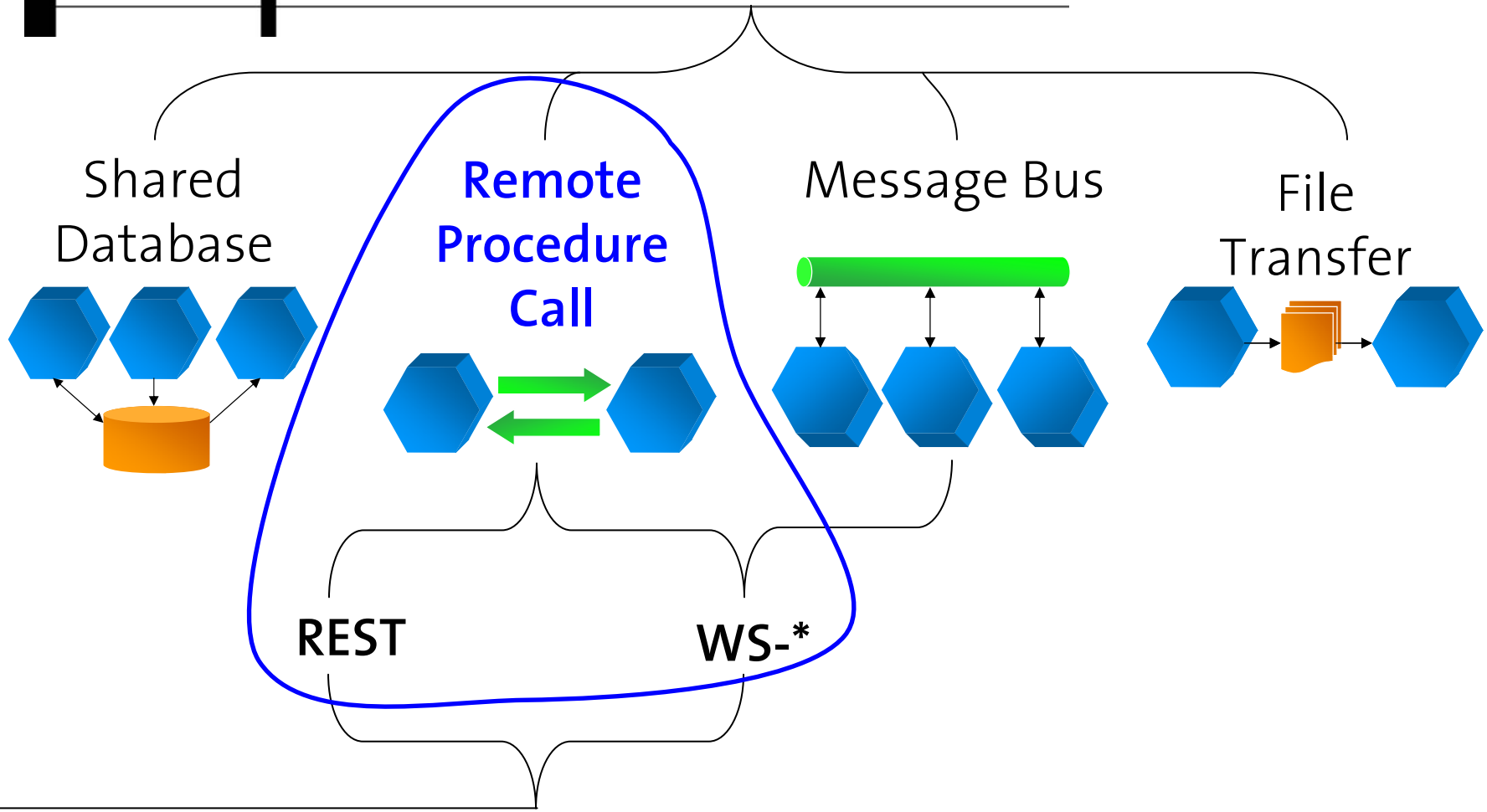
REST WS-*

Integration Technology Platform

Related Decisions (WS-*)



Related Decisions (RPC)



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Decision Space Overview

Architectural Decision and AAs	REST	WS-*
Integration Style	1 AA	2 AAs
Shared Database		
File Transfer		
Remote Procedure Call	✓	✓
Messaging		✓
Contract Design	1 AA	2 AAs
Contract-first		✓
Contract-last		✓
Contract-less	✓	
Resource Identification	1 AA	n/a
Do-it-yourself	✓	
URI Design	2 AA	n/a
"Nice" URI scheme	✓	
No URI scheme	✓	
Resource Interaction Semantics	2 AAs	n/a
Lo-REST (`POST`, `GET` only)	✓	
Hi-REST (4 verbs)	✓	
Resource Relationships	1 AA	n/a
Do-it-yourself	✓	
Data Representation/Modeling	1 AA	1 AA
XML Schema	(✓)[a]	✓
Do-it-yourself	✓	
Message Exchange Patterns	1 AA	2 AAs
Request-Response	✓	✓
One-Way		✓
Service Operations Enumeration	n/a	≥3 AAs
By functional domain		✓
By non-functional properties and QoS		✓
By organizational criterion (versioning)		✓
Total Number of Decisions, AAs	**8**, 10	**5**, ≥10

[a] Optional

Table 2: Conceptual Comparison Summary

Architectural Decision and AAs	REST	WS-*
Transport Protocol	1 AA	≥7 AAs
HTTP	✓	✓[a]
waka [13]	(✓)[b]	
TCP		✓
SMTP		✓
JMS		✓
MQ		✓
BEEP		✓
IIOP		✓
Payload Format	≥6 AAs	1 AA
XML (SOAP)	✓	✓
XML (POX)	✓	
XML (RSS)	✓	
JSON [10]	✓	
YAML	✓	
MIME	✓	
Service Identification	1 AA	2 AA
URI	✓	✓
WS-Addressing		✓
Service Description	3 AAs	2 AAs
Textual Documentation	✓	
XML Schema	(✓)[c]	✓
WSDL	✓[d]	✓
WADL [18]	✓	
Reliability	1 AA	4 AAs
HTTPR [38][e]	(✓)	(✓)
WS-Reliability		✓
WS-ReliableMessaging		✓
Native		✓
Do-it-yourself	✓	✓
Security	1 AA	2 AAs
HTTPS	✓	✓
WS-Security		✓

Transactions	1 AA	3 AAs
WS-AT, WS-BA		✓
WS-CAF		✓
Do-it-yourself	✓	✓
Service Composition	2 AAs	2 AAs
WS-BPEL		✓
Mashups	✓	
Do-it-yourself	✓	✓
Service Discovery	1 AAs	2 AAs
UDDI		✓
Do-it-yourself	✓	✓
Implementation Technology	many	many
...	✓	✓
Total Number of Decisions, AAs	**10**, ≥17	**10**, ≥25

[a] Limited to only the verb `POST`
[b] Still under development
[c] Optional
[d] WSDL 2.0
[e] Not standard

Table 3: Technology Comparison Summary

Architectural Principle and Aspects	REST	WS-*
Protocol Layering	yes	yes
HTTP as application-level protocol	✓	
HTTP as transport-level protocol		✓
Dealing with Heterogeneity	yes	yes
Browser Wars	✓	
Enterprise Computing Middleware		✓
Loose Coupling, aspects covered	yes, 2	yes, 3
Time/Availability		✓
Location (Dynamic Late Binding)	(✓)	✓
Service Evolution:		
Uniform Interface	✓	
XML Extensibility	✓	✓
Total Principles Supported	**3**	**3**

Table 1: Principles Comparison Summary

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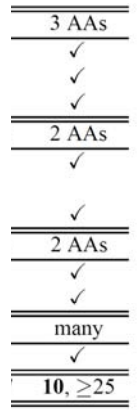
Outline

21 Decisions and 64 alternatives

Classified by level of abstraction:

- 3 Architectural **Principles**
- 9 **Conceptual** Decisions
- 9 **Technology**-level Decisions

Decisions help us to **measure the complexity** implied by the choice of REST or WS-*



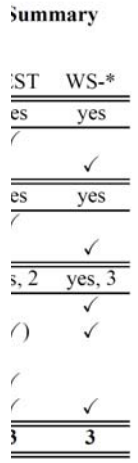


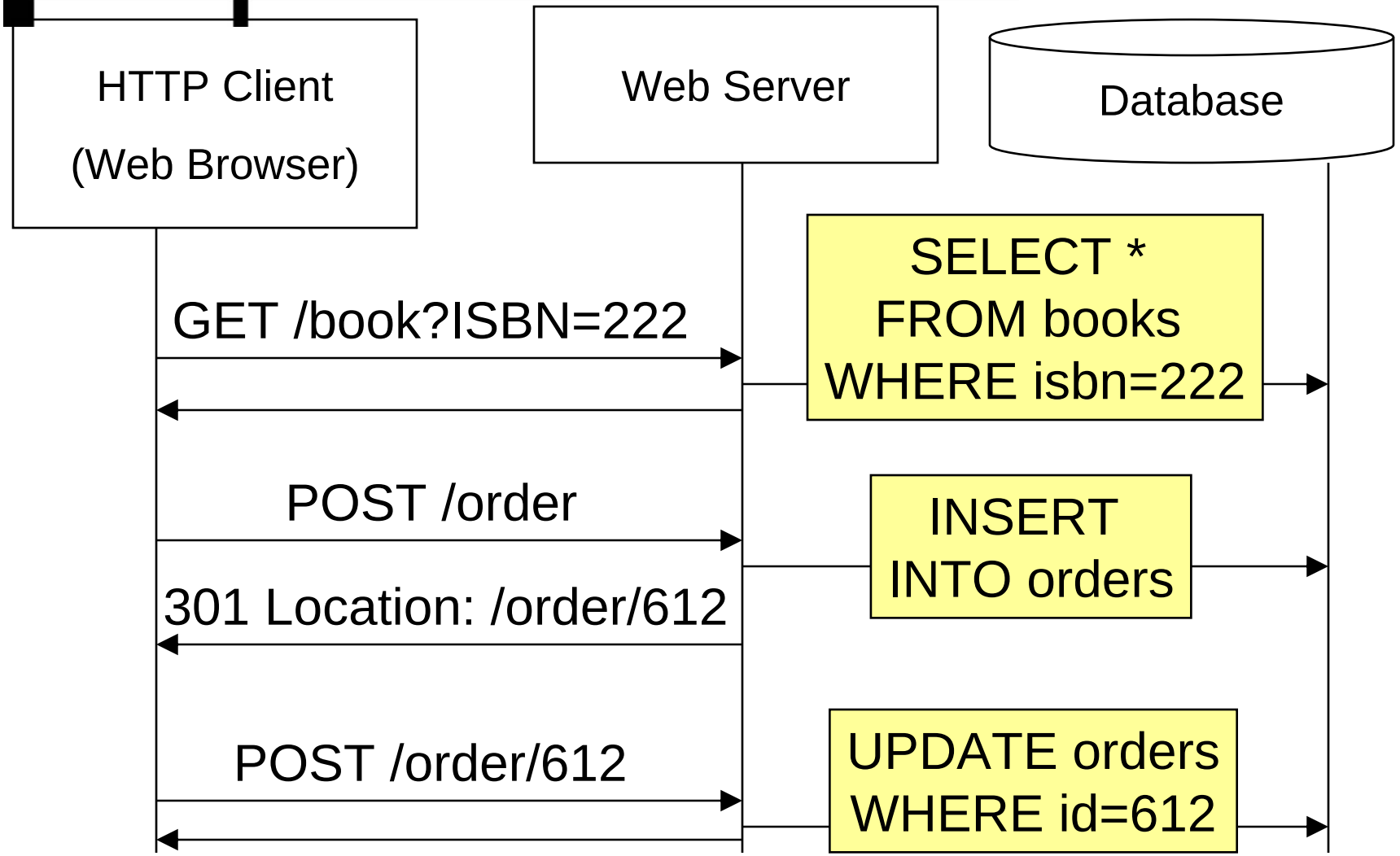
Table 2: Conceptual Comparison Summary

Table 1: Principles Comparison Summary

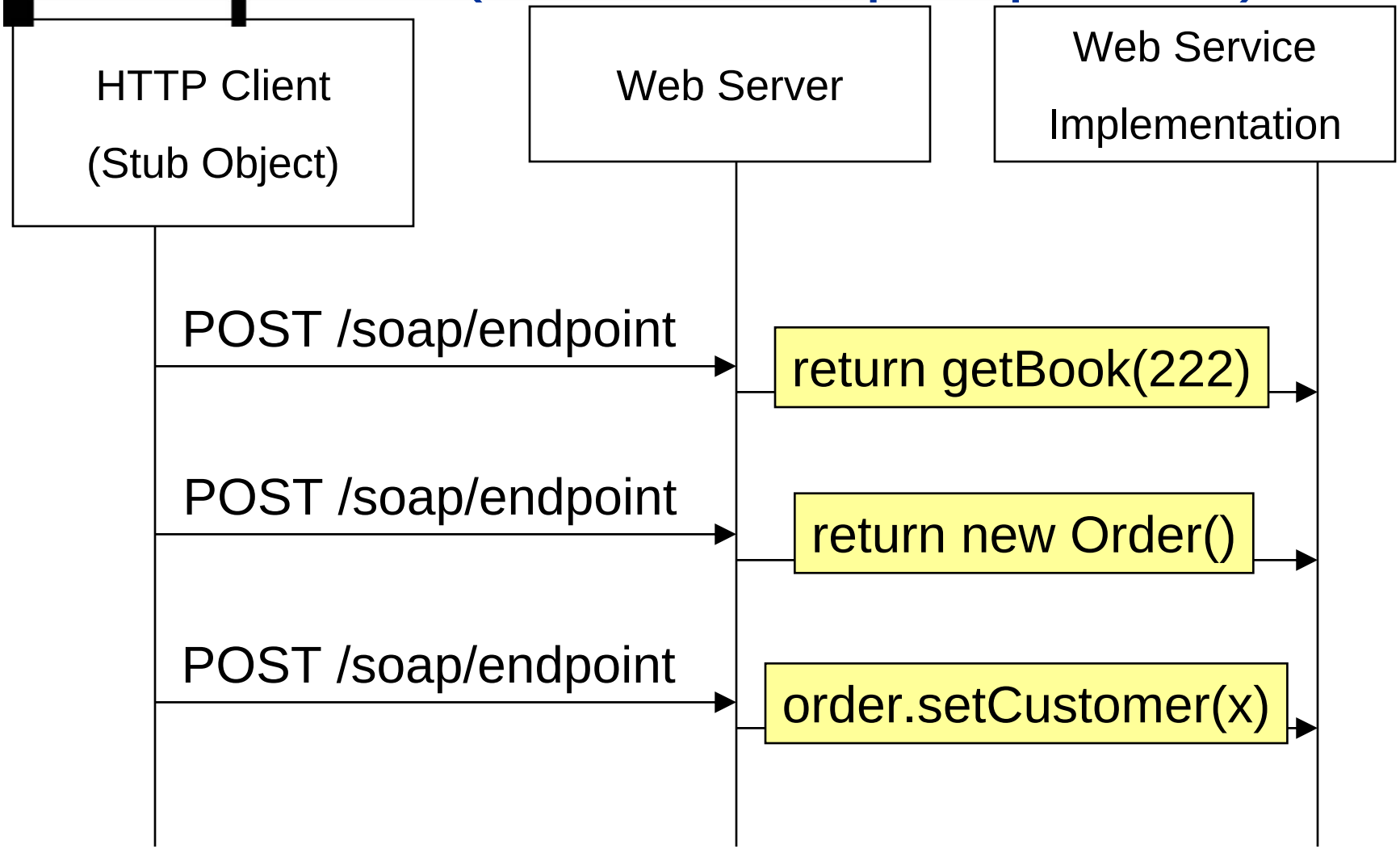
Architectural Principles

1. Protocol Layering
   - HTTP = Application-level Protocol (REST)
   - HTTP = Transport-level Protocol (WS-*)
2. Dealing with Heterogeneity
3. Loose Coupling

RESTful Web Service Example

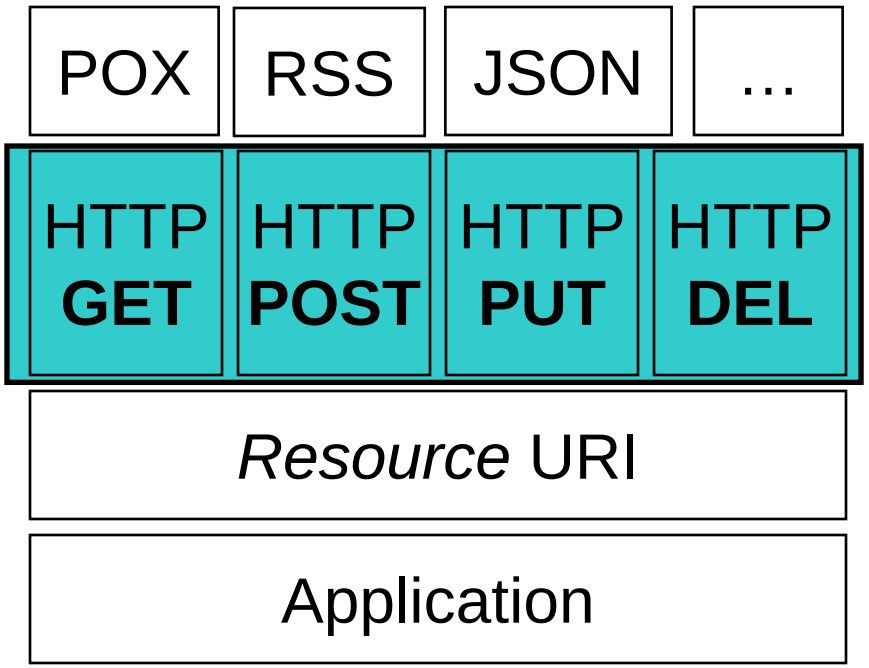


Big Web Service Example (from REST perspective)

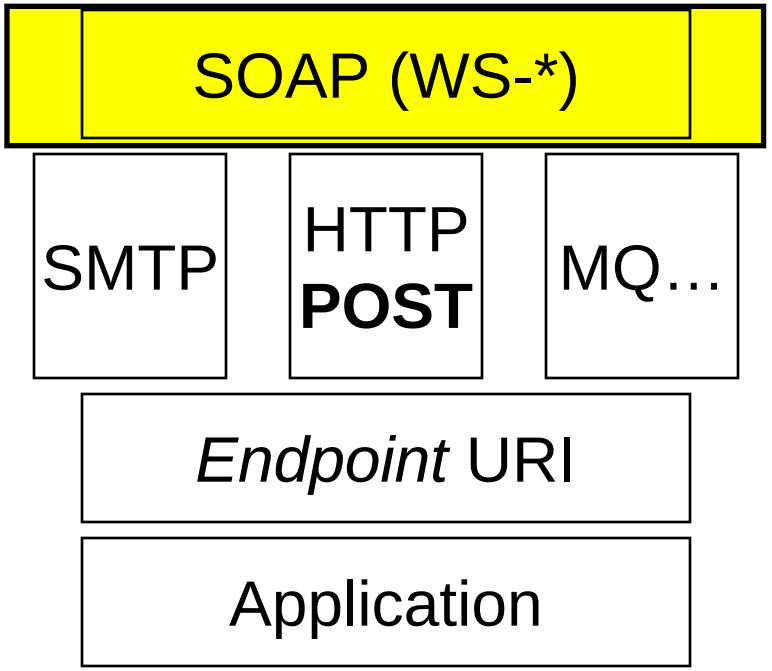


Protocol Layering

- "The Web is the universe of globally accessible information" (Tim Berners Lee)
  - Applications should publish their data on the Web (through URI)



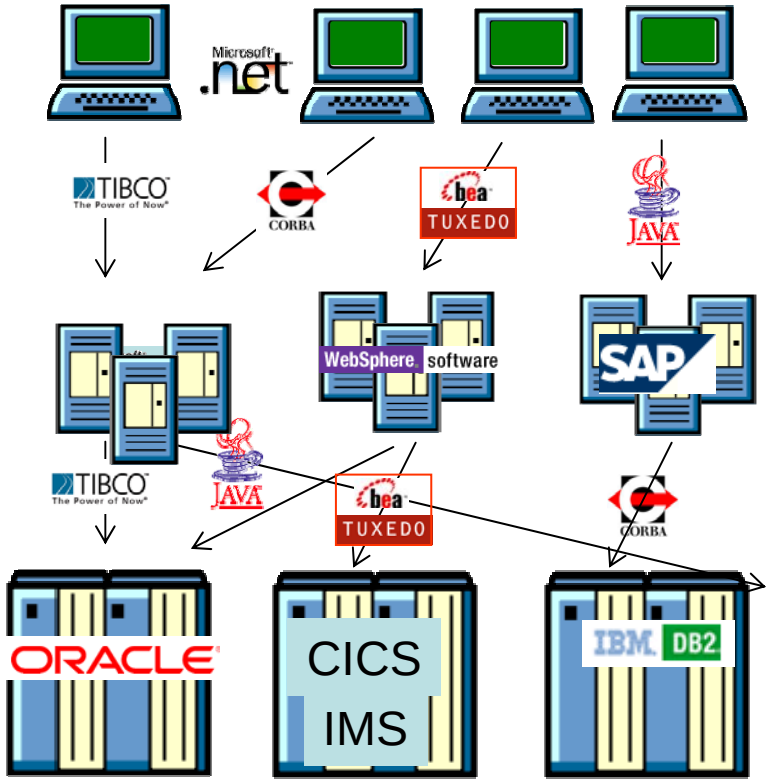
- "The Web is the universal (tunneling) transport for messages"
  - Applications get a chance to interact but they remain "outside of the Web"



Dealing with Heterogeneity

- Web Applications

- Enterprise Computing



Picture from Eric Newcomer, IONA

Conceptual Comparison

Architectural Decision and AAs	REST	WS-*
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Shared Database		
File Transfer		
Remote Procedure Call	✓	✓
Messaging		✓
Contract Design	1 AA	2 AAs
Contract-first		✓
Contract-last		✓
Contract-less	✓	
Resource Identification	1 AA	n/a
Do-it-yourself	✓	
URI Design	2 AA	n/a

Technology Comparison

Architectural Decision and AAs	REST	WS-*
Transport Protocol	1 AA	≥7 AAs
HTTP	✓	✓[a]
waka [13]	(✓)[b]	
TCP		✓
SMTP		✓
JMS		✓
MQ		✓
BEEP		✓
IIOP		✓
Payload Format	≥6 AAs	1 AA
XML (SOAP)	✓	✓
XML (POX)	✓	
XML (RSS)	✓	

Measuring Complexity

- Architectural Decisions give a **quantitative measure** of the complexity of an architectural design space:
  - Total number of decisions
  - For each decision, number of alternative options
  - For each alternative option, estimate the effort

	REST	WS-*
Decisions	17	14
Alternatives	27	35

Decisions with *1 or more* alternative options

Measuring Complexity

	REST	WS-*
Decisions	**5**	**12**
Alternatives	**16**	**32**

Decisions with *more than 1* alternative options

	REST	WS-*
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Decisions with *1 or more* alternative options

Measuring Complexity

	REST	WS-*
Decisions	**5**	**12**
Alternatives	**16**	**32**

Decisions with *more than 1* alternative options

- URI Design
- Resource Interaction Semantics
- Payload Format
- Service Description
- Service Composition

Measuring Complexity

	REST	WS-*
Decisions	5	12
Alternatives	16	32

Decisions with *more than 1* alternative options

	REST	WS-*
Decisions	12	2

Decisions with *only 1* alternative option

Measuring Complexity

- Payload Format
- Data Representation Modeling

	REST	WS-*
Decisions	**12**	**2**

Decisions with *only 1* alternative option

Measuring Effort

	REST	WS-*
Do-it-yourself Alternatives	5	0

Decisions with **only** *do-it-yourself* alternatives

	REST	WS-*
Decisions	12	2

Decisions with *only 1* alternative option

Measuring Effort

	REST	WS-*
Do-it-yourself Alternatives	**5**	**0**

Decisions with **only** *do-it-yourself* alternatives

- Resource Identification
- Resource Relationship
- Reliability
- Transactions
- Service Discovery

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Freedom of Choice
Freedom from Choice

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Location (Dynamic Late Binding)	(✓)	✓
Service Evolution:		
Uniform Interface	✓	
XML Extensibility	✓	✓
Total Principles Supported	**3**	**3**

Table 1: Principles Comparison Summary

Comparison Summary

- Architectural Decisions measure complexity implied by alternative technologies

- **REST simplicity** = freedom from choice
  - 5 decisions require to choose among 16 alternatives
  - 12 decisions are already taken (but 5 are *do-it-yourself*)

- **WS-* complexity** = freedom of choice
  - 12 decisions require to choose among 32 alternatives
  - 2 decisions are already taken (SOAP, WSDL+XSD)

Conclusion

- You should focus on whatever solution gets the job done and try to **avoid being religious** about any specific architectures or technologies.
- WS-* has strengths and weaknesses and will be highly suitable to some applications and positively terrible for others. Likewise with REST.
- The decision of which to use depends entirely on the application requirements and constraints.
- We hope this comparison will help you make the right choice.

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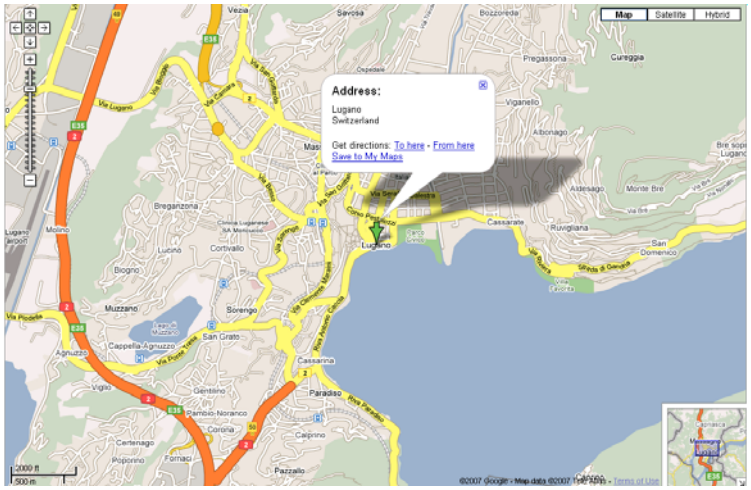
What is a “nice” URI?

Prefer Nouns to Verbs

Keep them Short

http://map.search.ch/lugano

http://maps.google.com/lugano



http://maps.google.com/maps?f=q&hl=en&q=lugano,+switzerland&layer=&ie=UTF8&z=12&om=1&iwloc=addr