

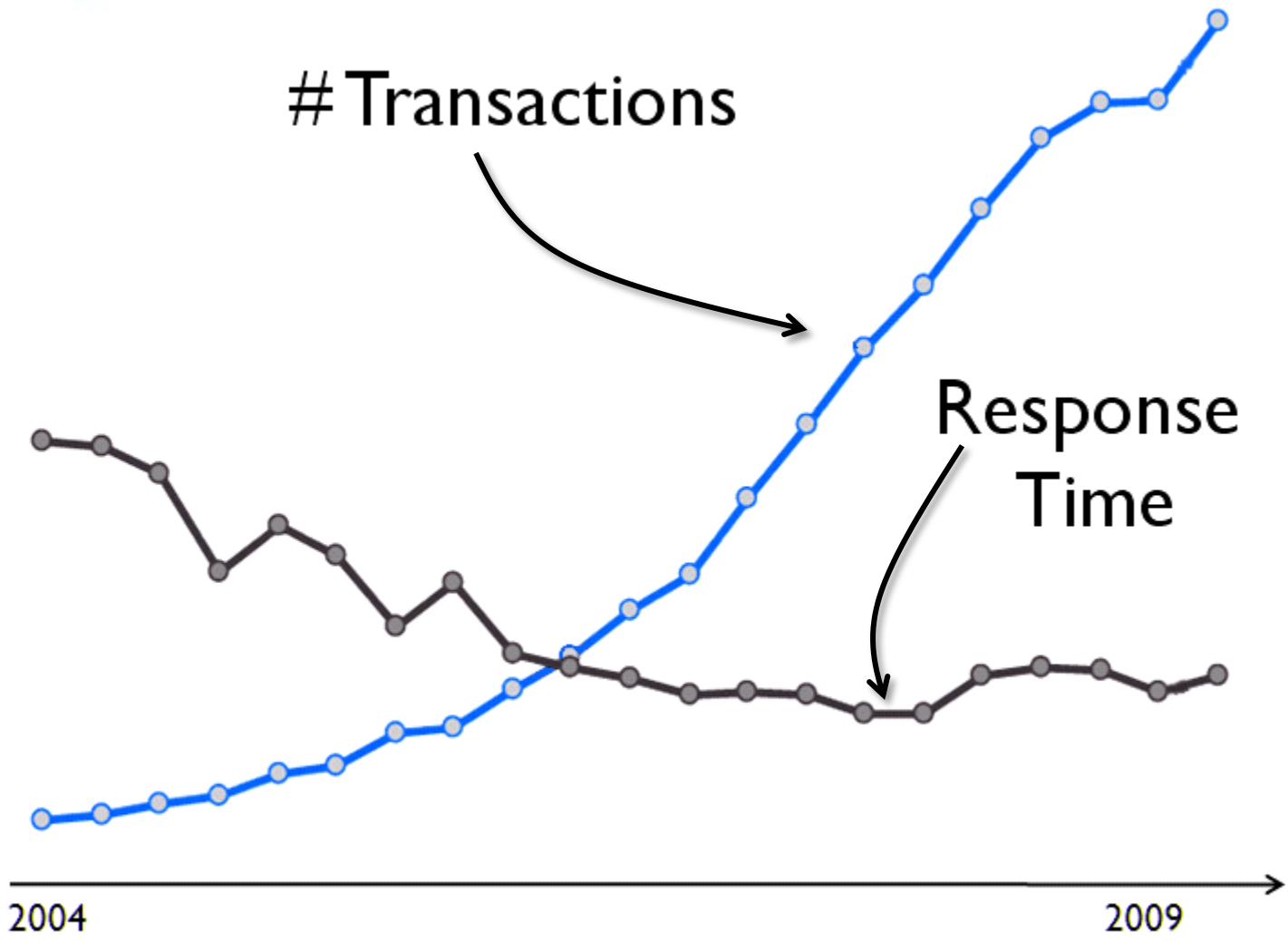
Towards an

Architectural Style

for **Multi-tenant**
Software Systems



Dr.-Ing. Heiko Koziolk
Industrial Software Systems
ABB Corporate Research





28.04.2008:

„SAPs neue Mittelstandssoftware
‘Business By Design‘ klemmt“

25.10.2008:

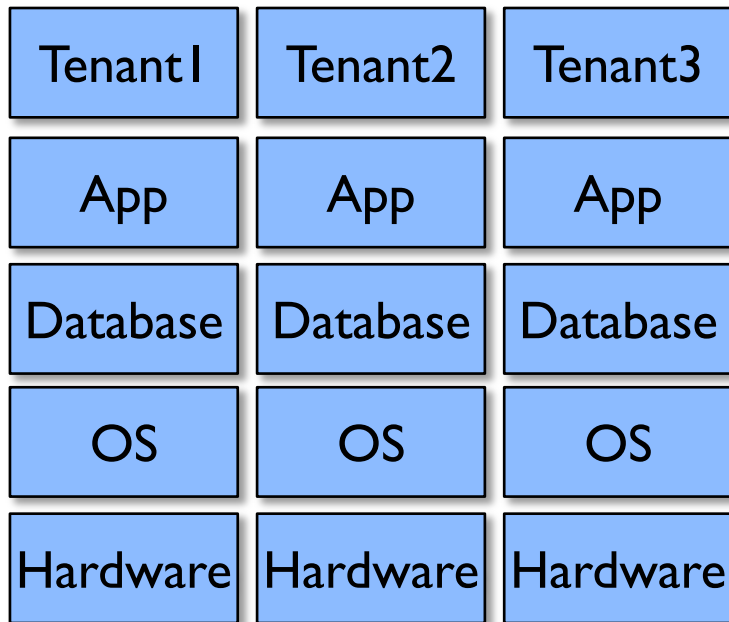
„SAP will sich von
Outsourcing-Tochter trennen“

19.02.2009:

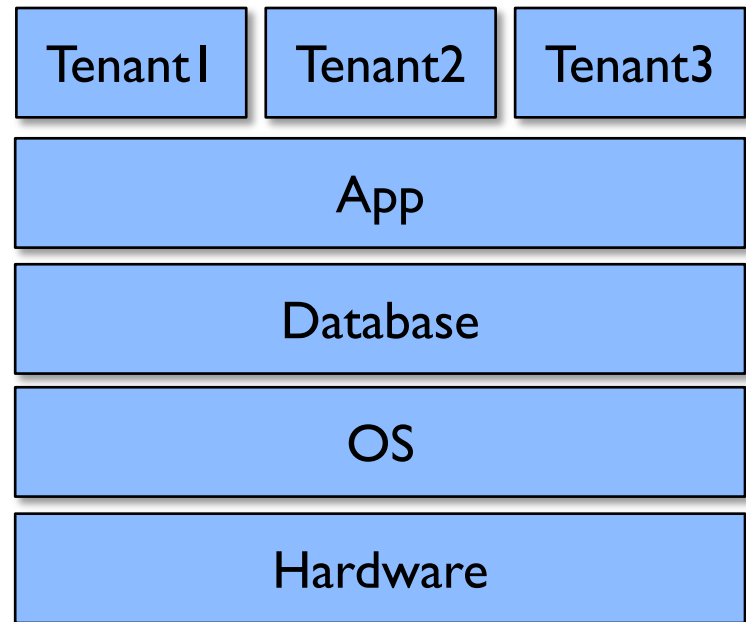
„SAP dementiert Verkaufsstopp
für ‘Business by Design‘“

Source: heise.de

Single-Tenancy



Multi-Tenancy



Challenges

Lack of
Documentation



Ad-hoc
Solutions



Technology
Focus



Architectural Styles

An architectural style is a coordinated set of **architectural constraints** that restricts the roles / features of **architectural elements** and the allowed relationships among those elements within any architecture that conforms to that style.

- Client / Server
- Pipe-and-Filter
- Peer-to-Peer
- Mobile Code

- Blackboard
- C2
- REST (WWW)
- SPIAR (AJAX)

[Fielding2000]

Idea: Multi-tenancy Style



Resource Sharing



Elasticity

Architectural Properties

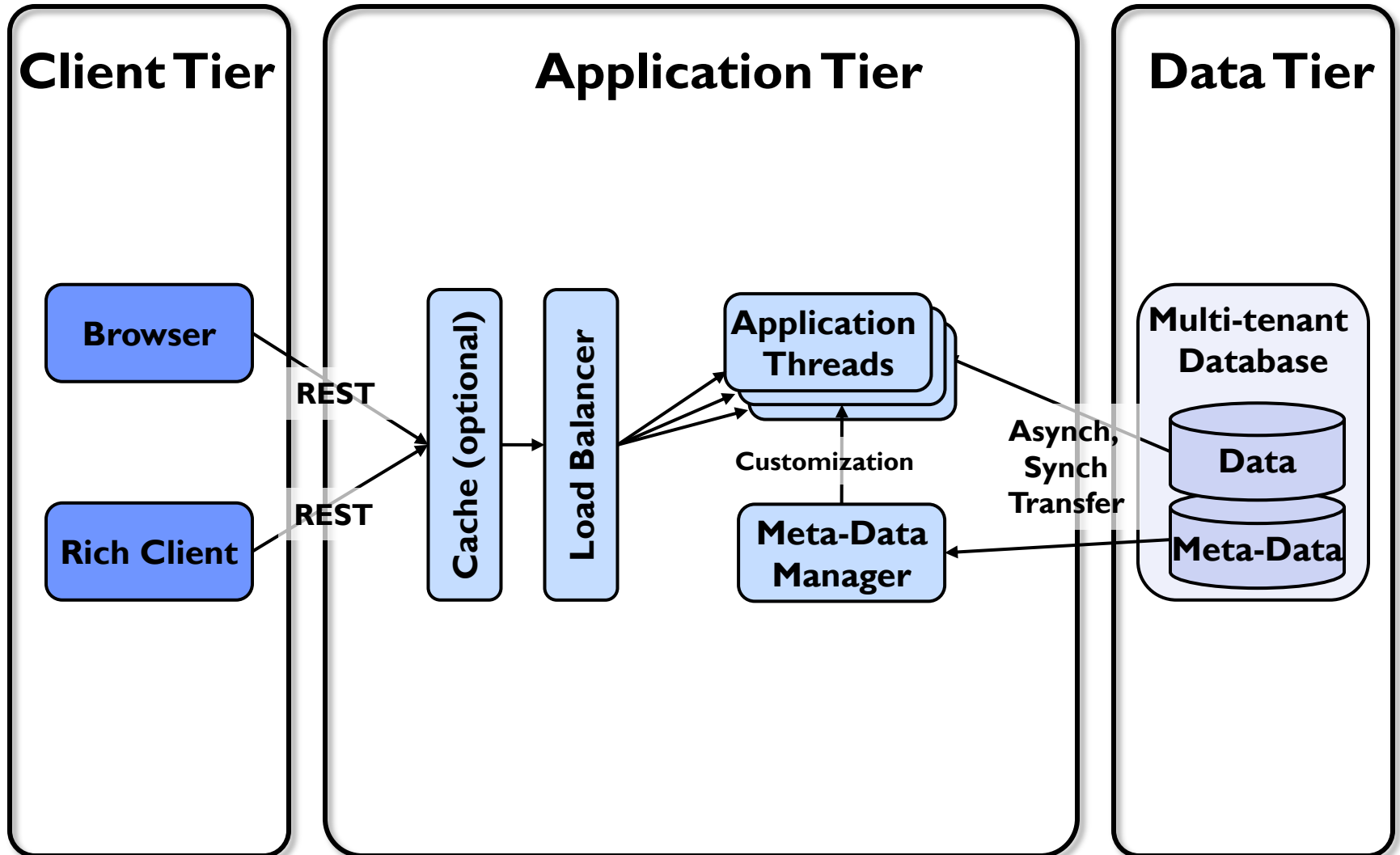


Maintainability

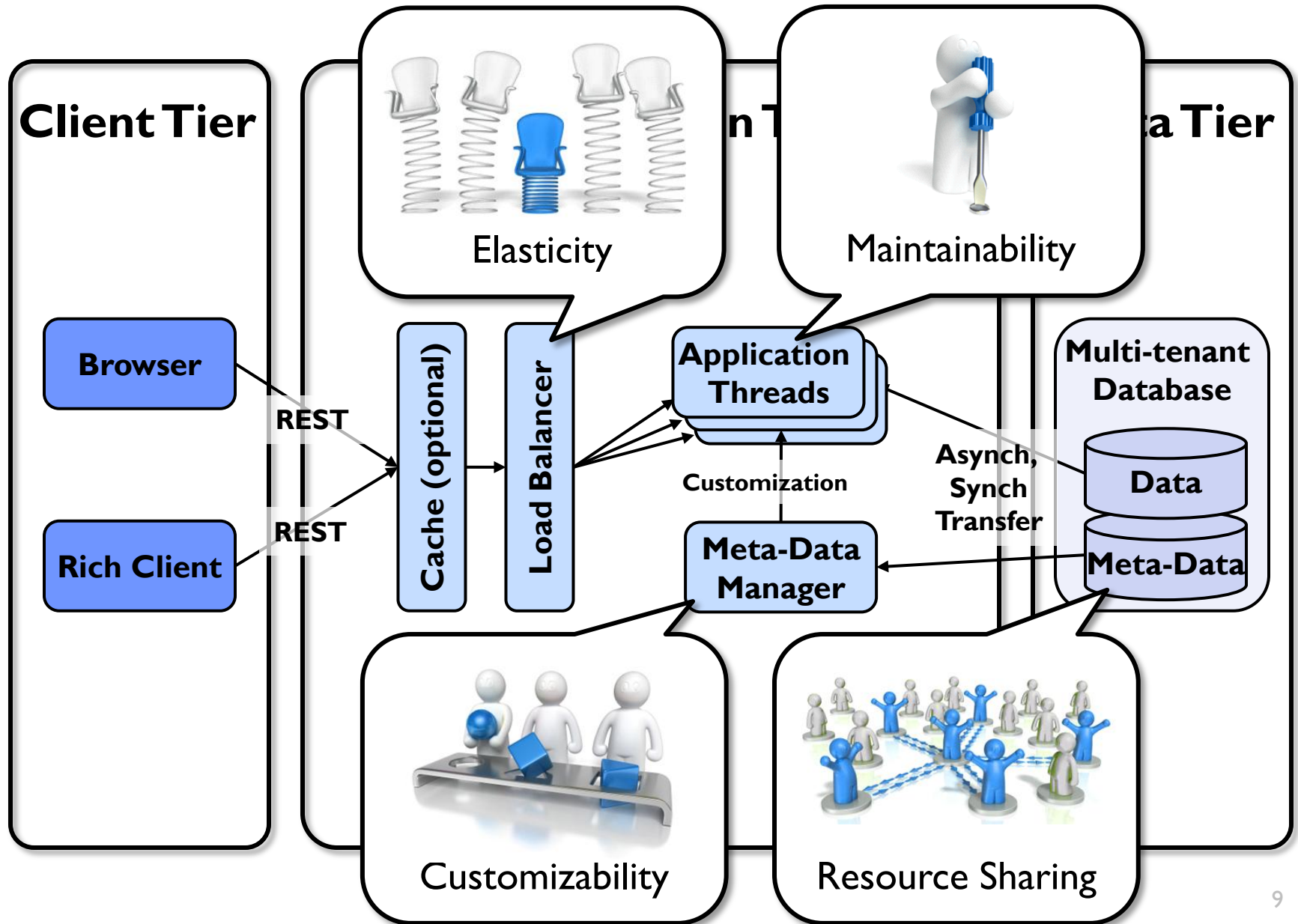


Customizability

SPOSAD Style for Multi-Tenancy



SPOSAD Style for Multi-Tenancy



Multi-tenant Database

Private Table Layout

Extension Table Layout

Universal Table Layout



Multi-tenant Database

Private Table Layout

Extension Table Layout

Universal Table Layout

Account27			
AID	Name	Robot	Speed
1	ABC	X	20
2	DEF	Y	50

Account33	
AID	Name
1	GHI

Account46		
AID	Name	Lines
1	JKM	12



Multi-tenant Database

Private Table Layout

Extension Table Layout

Universal Table Layout

Account-Extension			
Tenant ID	Row	AID	Name
27	0	1	ABC
27	1	2	DEF
33	0	1	GHI
46	0	1	JKM

Industrial-Account			
Tenant ID	Row	Robot	Speed
27	0	X	20
27	1	Y	50

Telecommunication-Account		
Tenant ID	Row	Lines
46	0	12



Multi-tenant Database

Private Table Layout

Extension Table Layout

Universal Table Layout

Universal							
Tenant ID	Table	Col1	Col2	Col3	Col4	Col5	Col6
27	0	1	ABC	X	20	-	-
27	0	2	DEF	Y	50	-	-
33	1	1	GHI	-	-	-	-
46	2	1	JKM	12	-	-	-





Single Code Base



Shared
Data Resources

Architectural Constraints



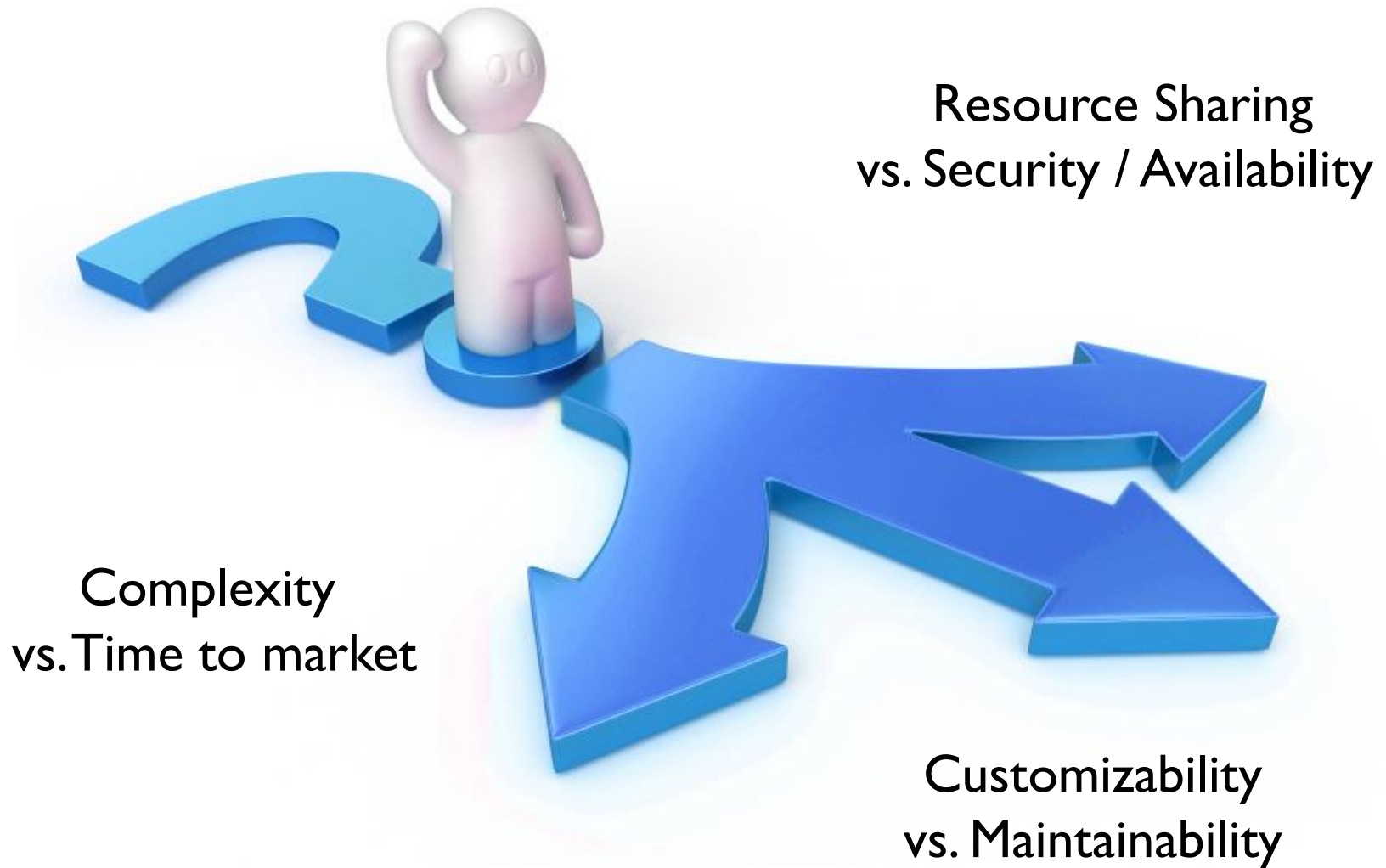
Customization Component

STATE



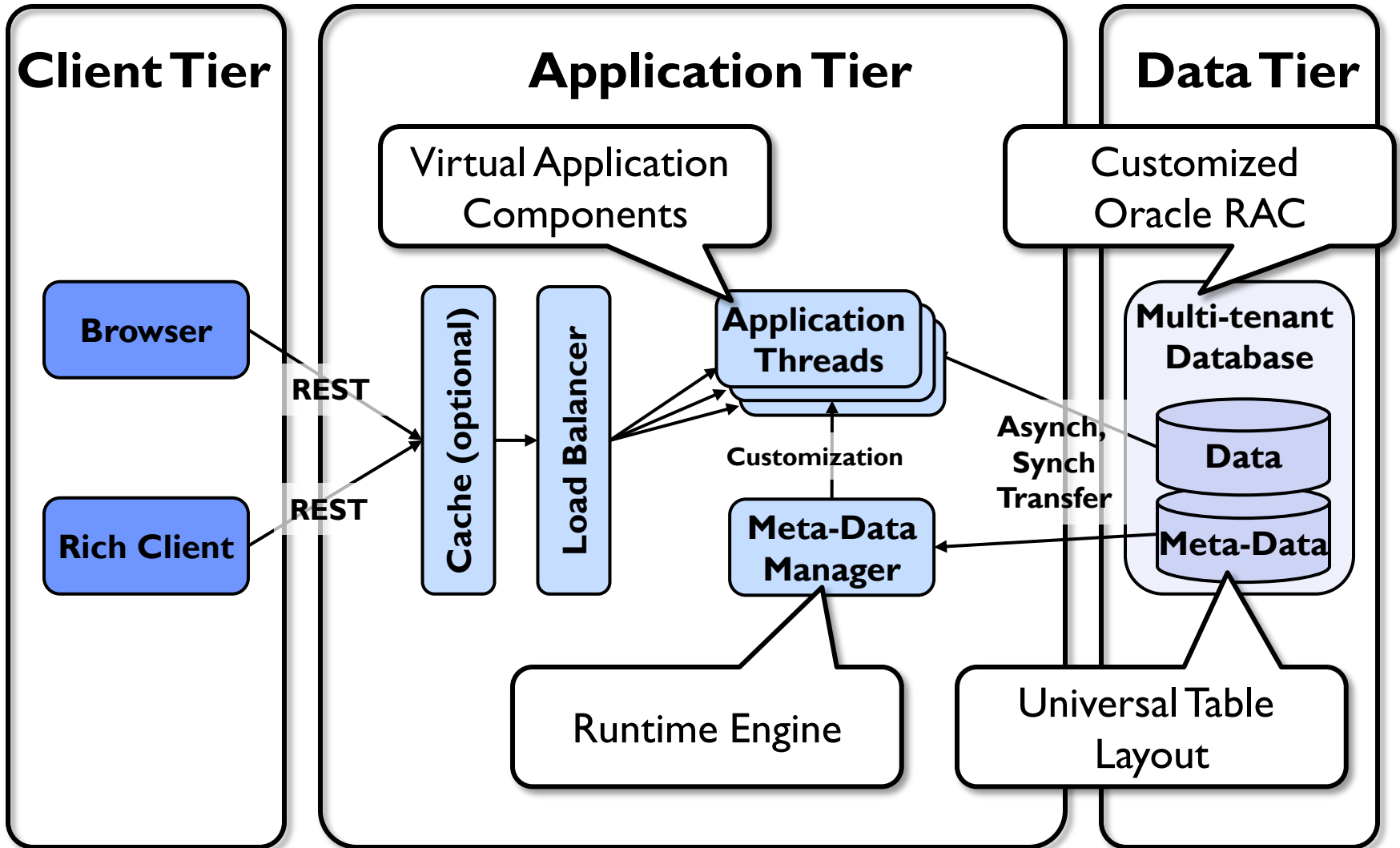
Stateless Application Tier

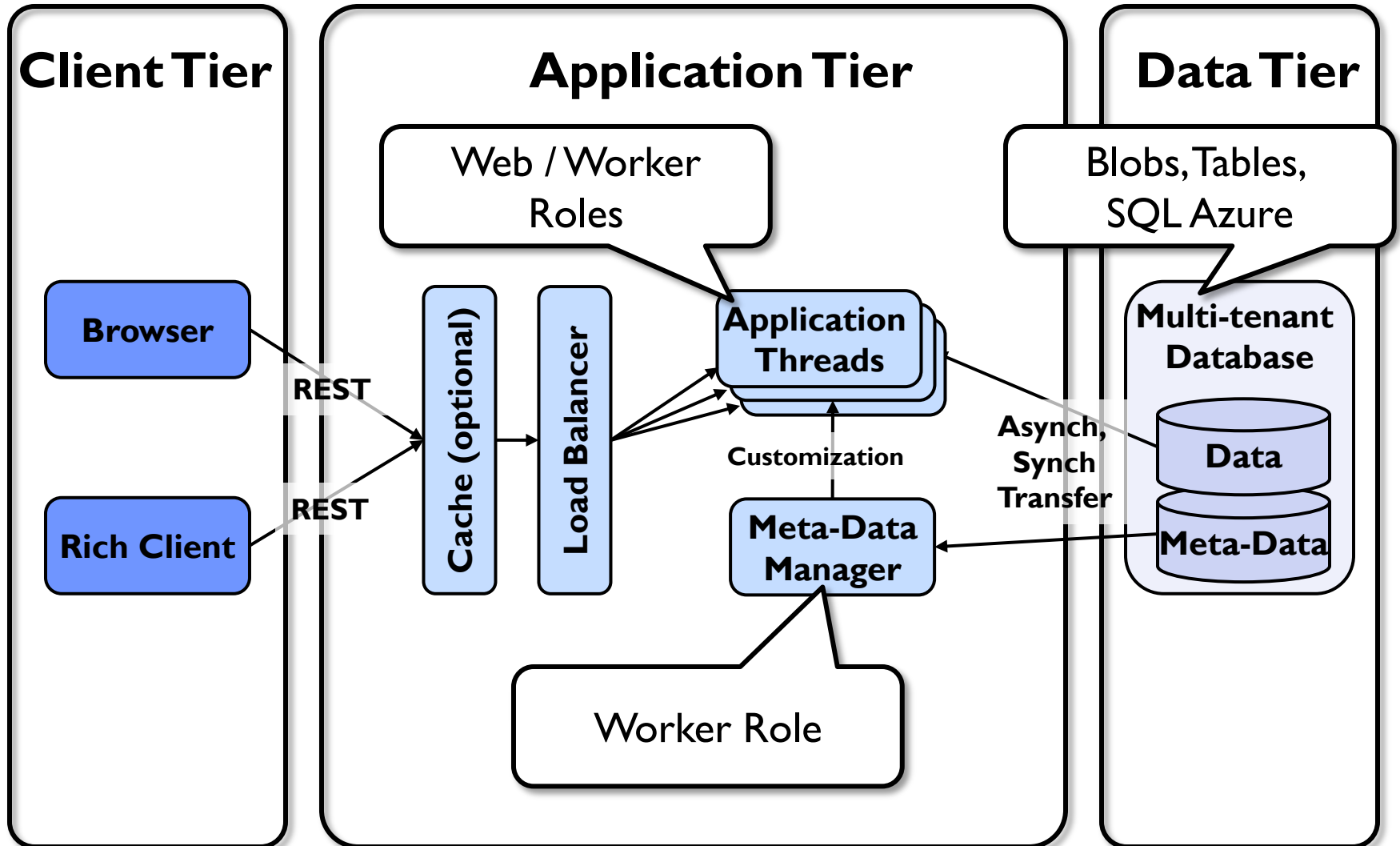
Architectural Trade-offs

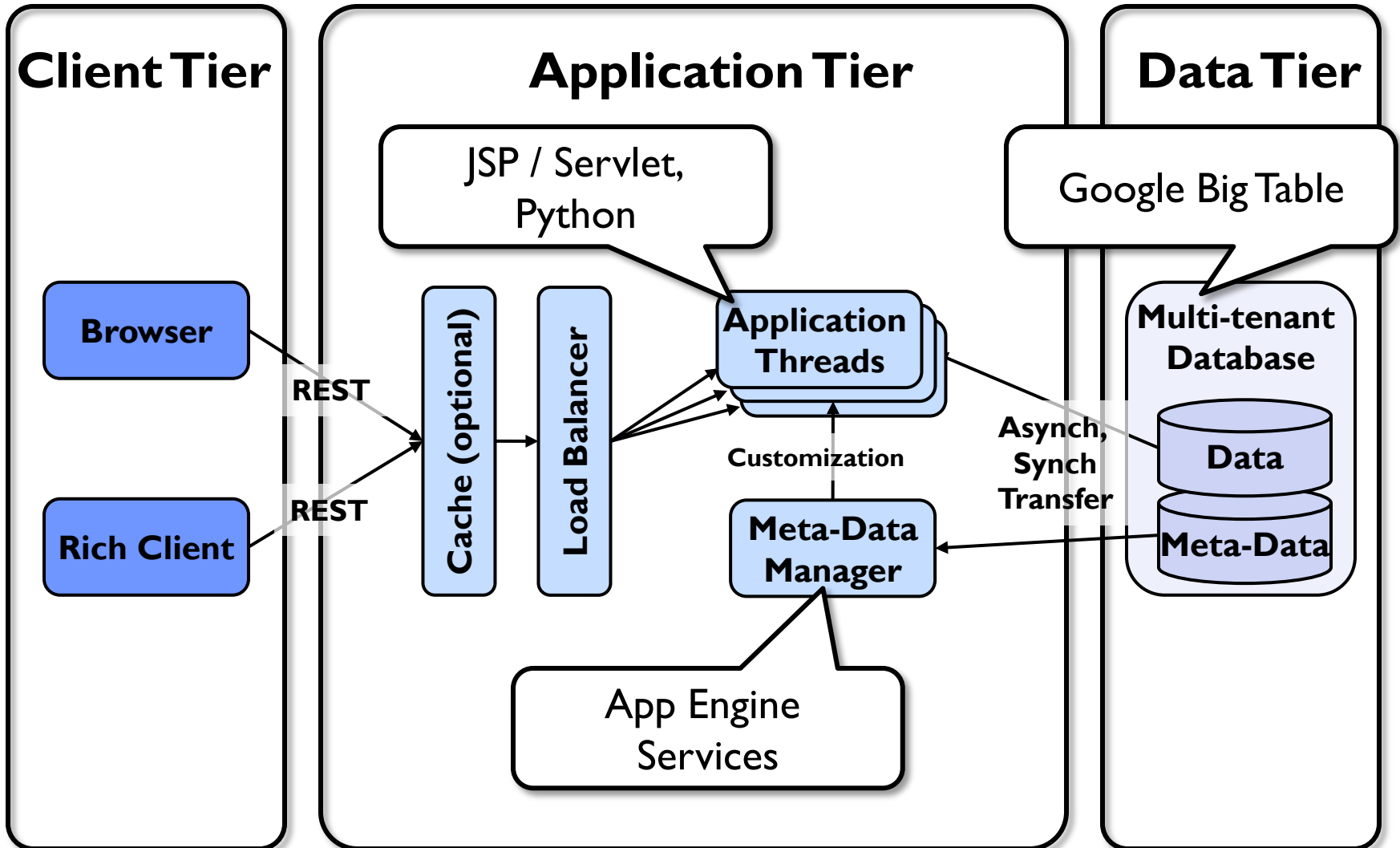


Evaluation?











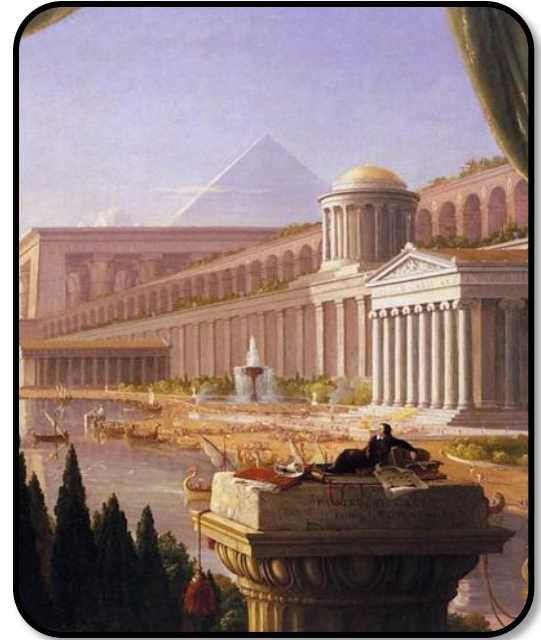
27.01.2010

„Mit dem Featurepack 2.5,
das Mitte dieses Jahres erscheint,
bekommt Business ByDesign
eine **Multi-Tenant-Architektur**“

Peter Lorenz
Leiter SME Solutions SAP

Source: isreport.de

Conclusions



Multi-tenancy as an Architectural Style

Power and productivity
for a better world™

