
Think it easy

Università degli Studi di Pavia

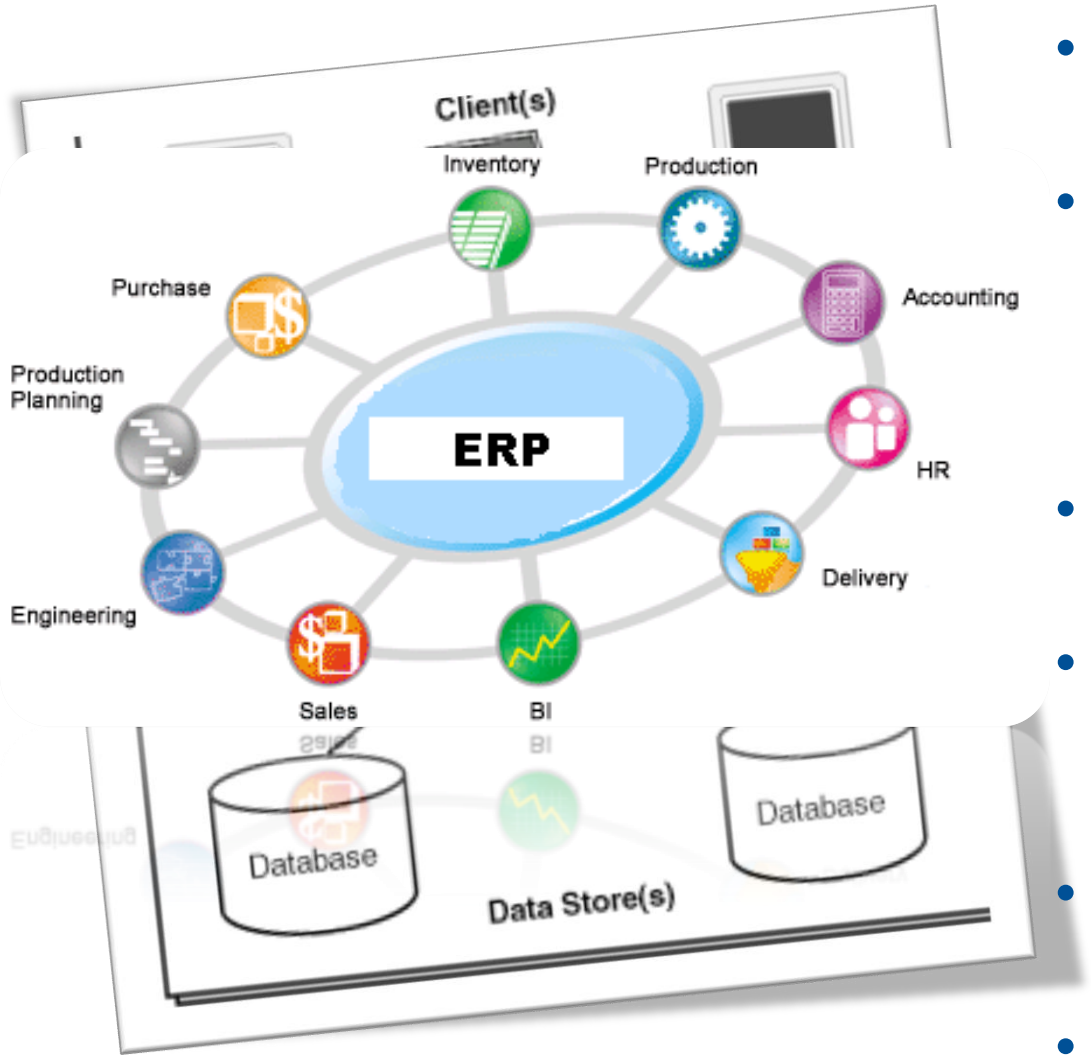
SAP Netweaver technology platform
History and evolution

Think it easy

Generation 1: Main Frame

- Huge leap in automation
- Single DB: central point of integration
- All level of the “stack“ (application/integration/ UI/persistency) contained in a single application
- TIGHTLY COUPLED logic, not flexible
- Not standardized APIs to access functionalities

Generation 2: Client/Server



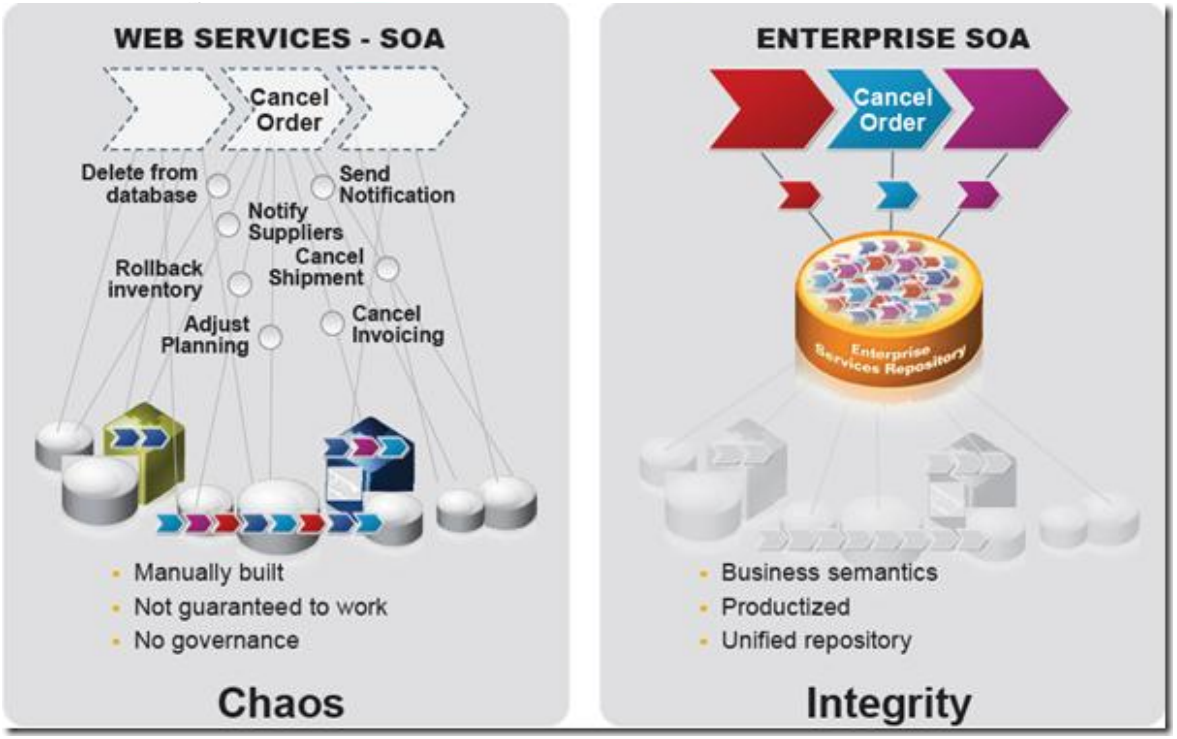
- ERP client/server architecture popular
- ERP for financial and mgmt, CRM, SCM, SRM to expand the range of automation
- Best of breed – best app for each purpose
- Solution from different vendor / no central point of integration
- Data scattered or duplicated
- Integration needed

Generation 3: Bridging the gap among systems

The challenge is integration
Cross application process
Web based UIs connect different apps, BW data from different source
EAI integrate and ORCHESTRATE

- New technology to bridge (still Best of Breed)
- mySAP Business Suite + Netweaver *(Integrate Ent. Appl is not a customer Problem)*

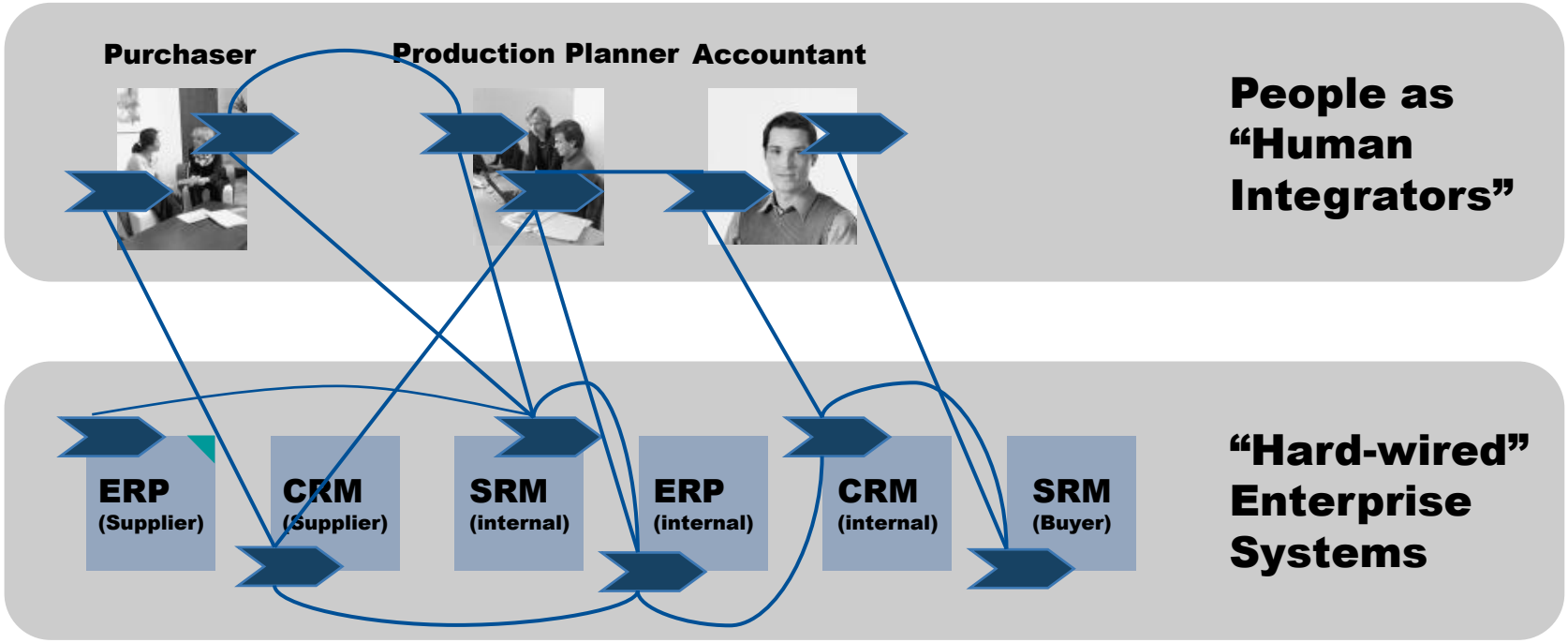
Generation 4: The Adaptive Value Network



- Web services: every application can expose/use its functionality.
- Service Oriented Architecture – reusable part & reusable service.
- Composite application – data distributed over different application

- Who should build your own service ?
- Adoption of reusable repository of services to answer to: Who build? What tool ? How make them work ?
- eSOA provides the blueprint for building SOA based composite applications

Extended Order-To-Cash Process



Extended Order-To-Cash: Process Orchestration

Purchaser **Production Planner** **Accountant**

Internal & external users

Order Management **Sourcing** **Account Management**

Enterprise Services **SAP NetWeaver**

Portal Integration of existing apps

ERP (Supplier) | **CRM** (Supplier) | **SRM** services (internal) | **ERP** services (internal) | **CRM** services (internal) | **SRM** (Buyer)

Enterprise systems

Netweaver: eSOA Enabling platform

Browser, Devices, ...

Composite Applications
enable flexible collaboration

SAP NetWeaver

People Integration

Information Integration

Process Integration

SRM | **PLM** | **ERP** | **SCM** | **CRM**

Next Generation Technology Innovations

Each "next generation" introduces technology innovations in …

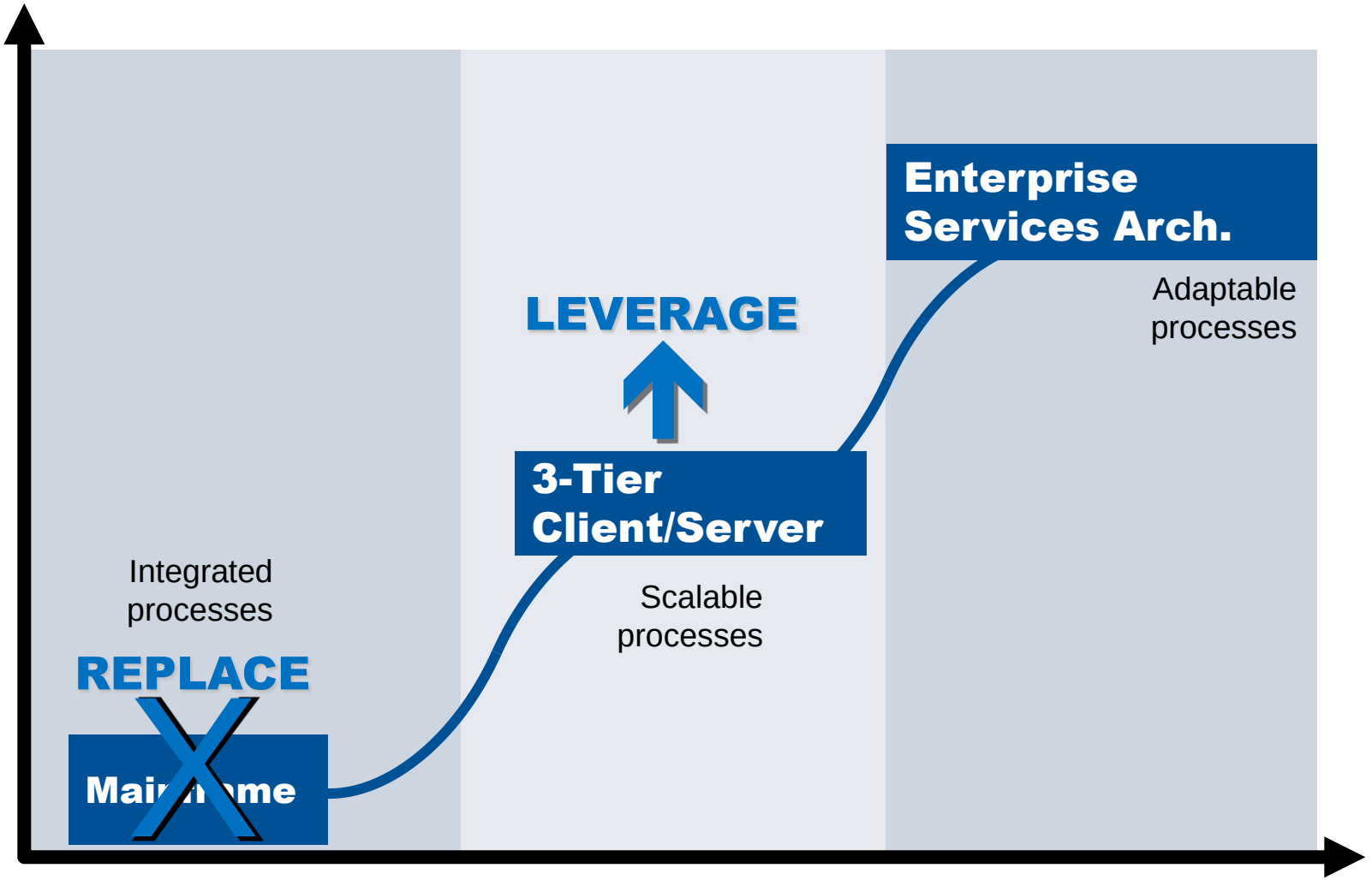
REACH
More people interact with the solution

INTEGRATION
More systems connected in end-to-end processes

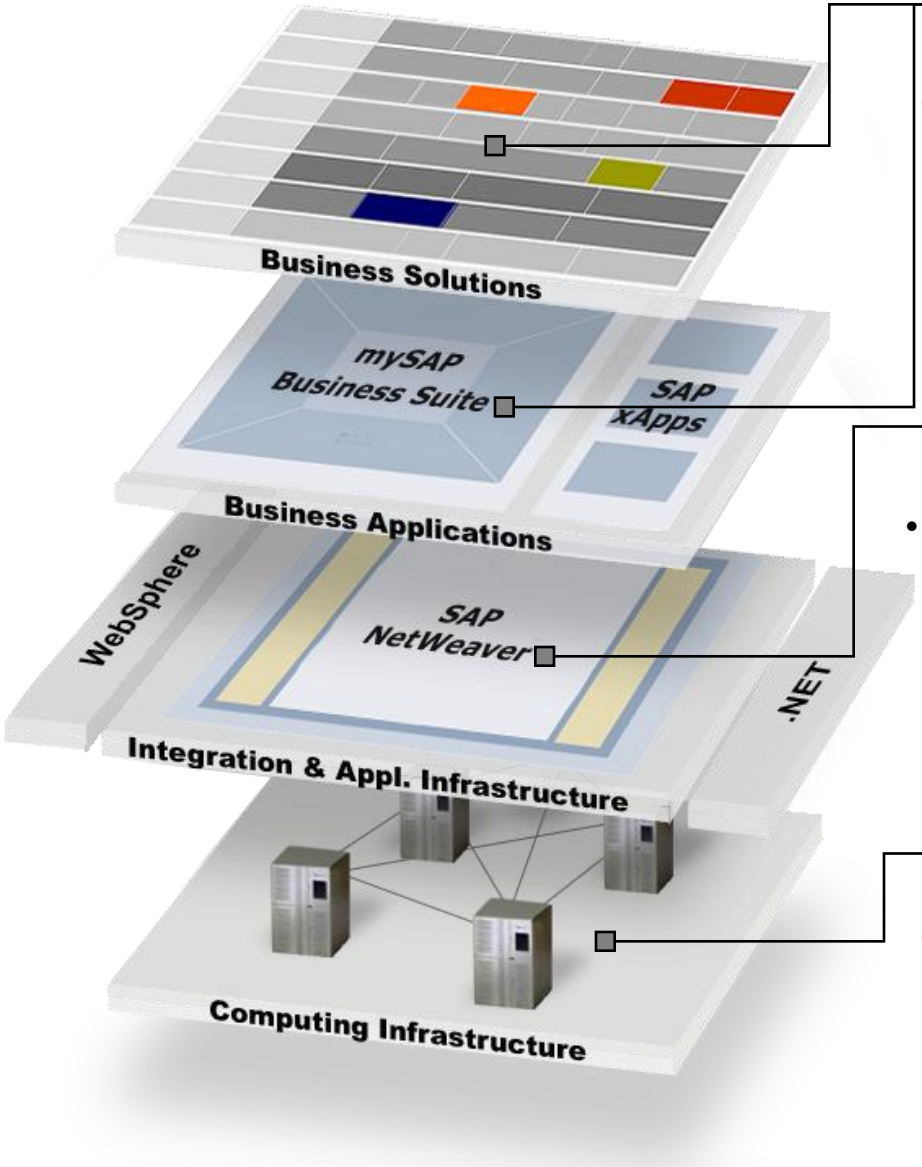
FLEXIBILITY
More freedom to adapt IT to business needs

… to help overcome key business issues and drive higher ROI

The next "Next Generation" has to leverage today's Investment



SAP NetWeaver in the overall business solution



SAP Business Solutions

- **Unified collection of SAP Solution – mySAP Business Suite**

SAP NetWeaver

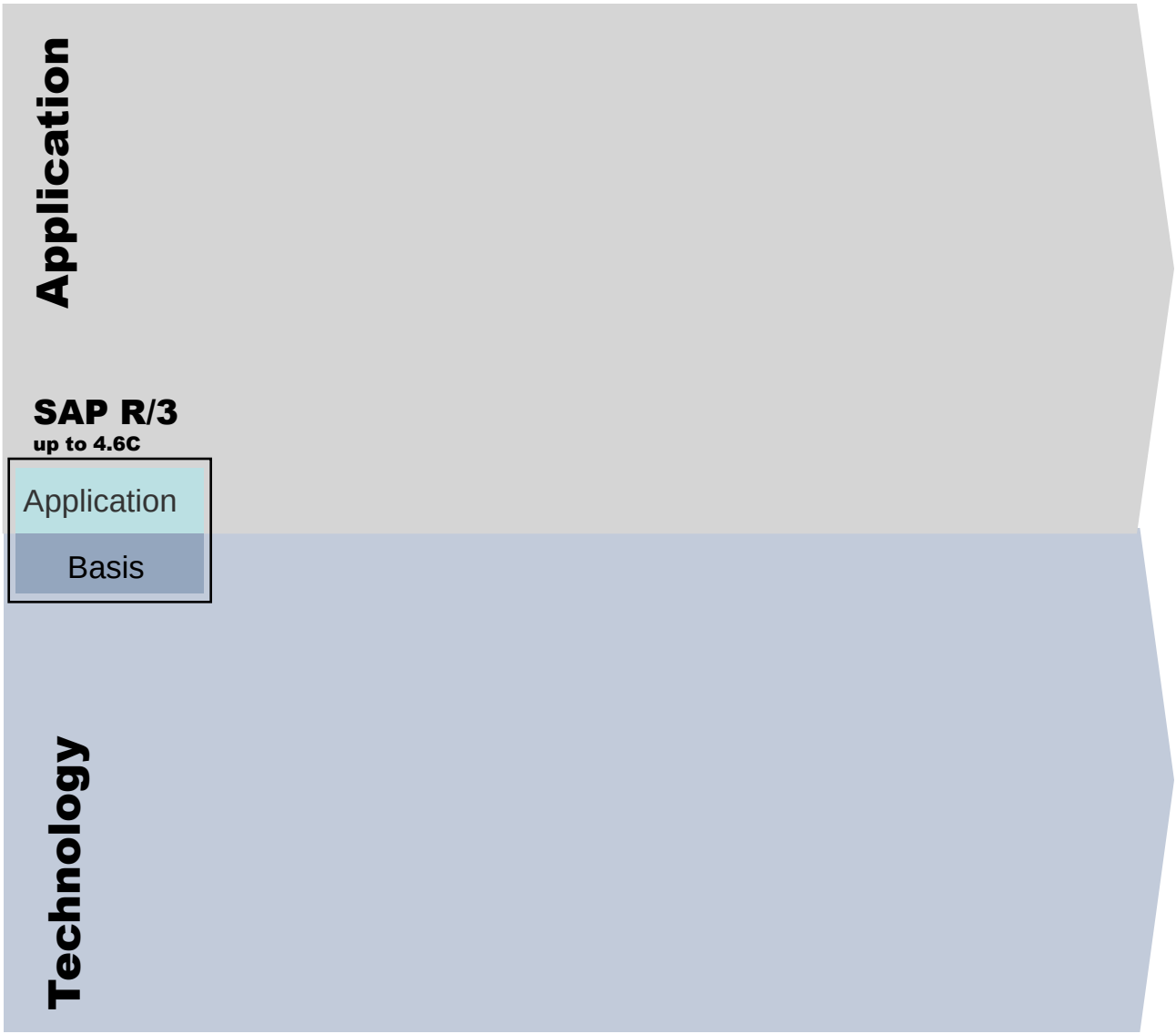
- **SAP NetWeaver is a single, integrated set of technologies to unify a huge collection of integration and dev. functionalities**

Computing Technology

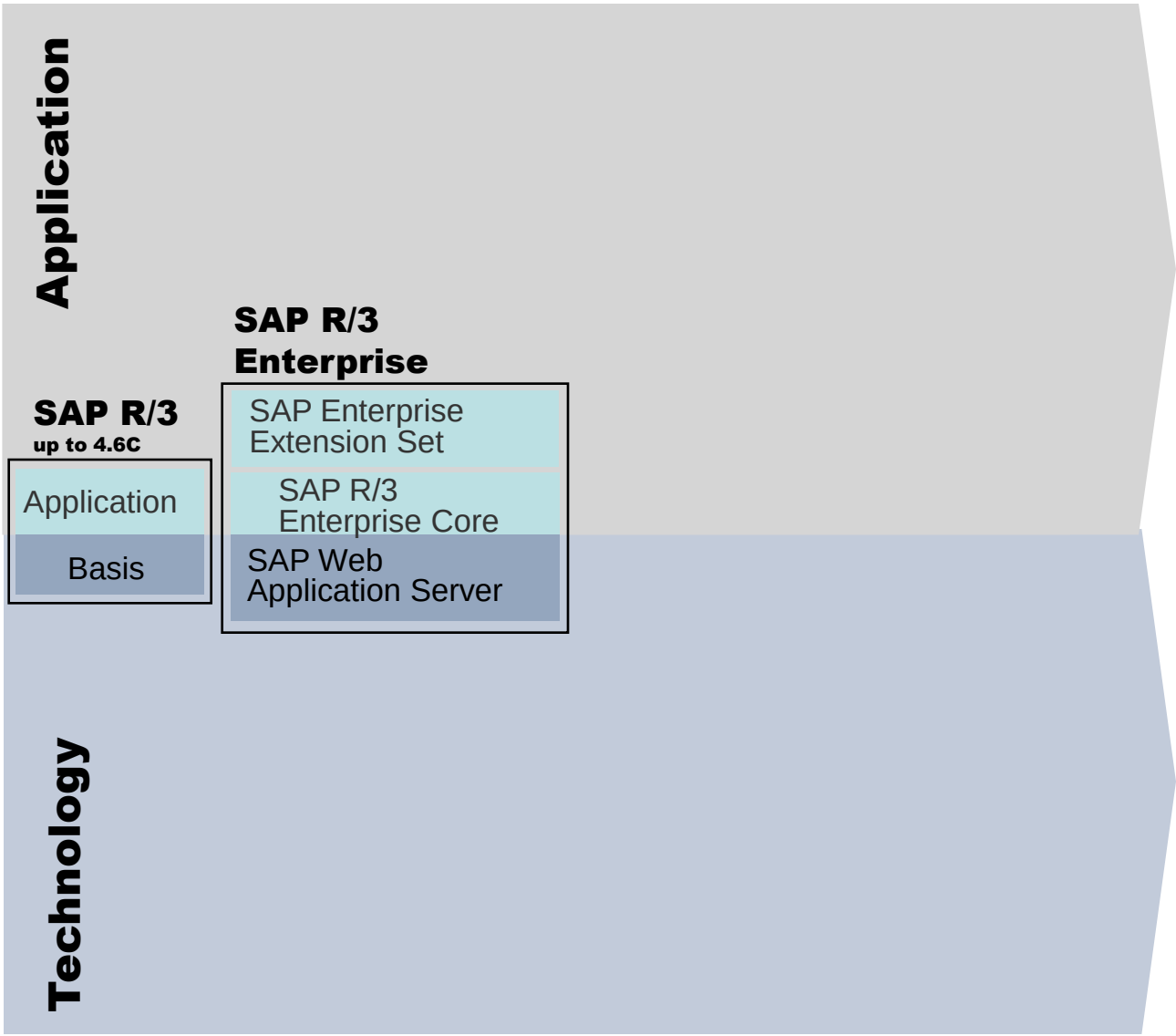
- **A wide list of supported computing technology (hardware, operation systems, databases etc.)**

More into the technology side

Architecture of mySAP ERP



Architecture of mySAP ERP



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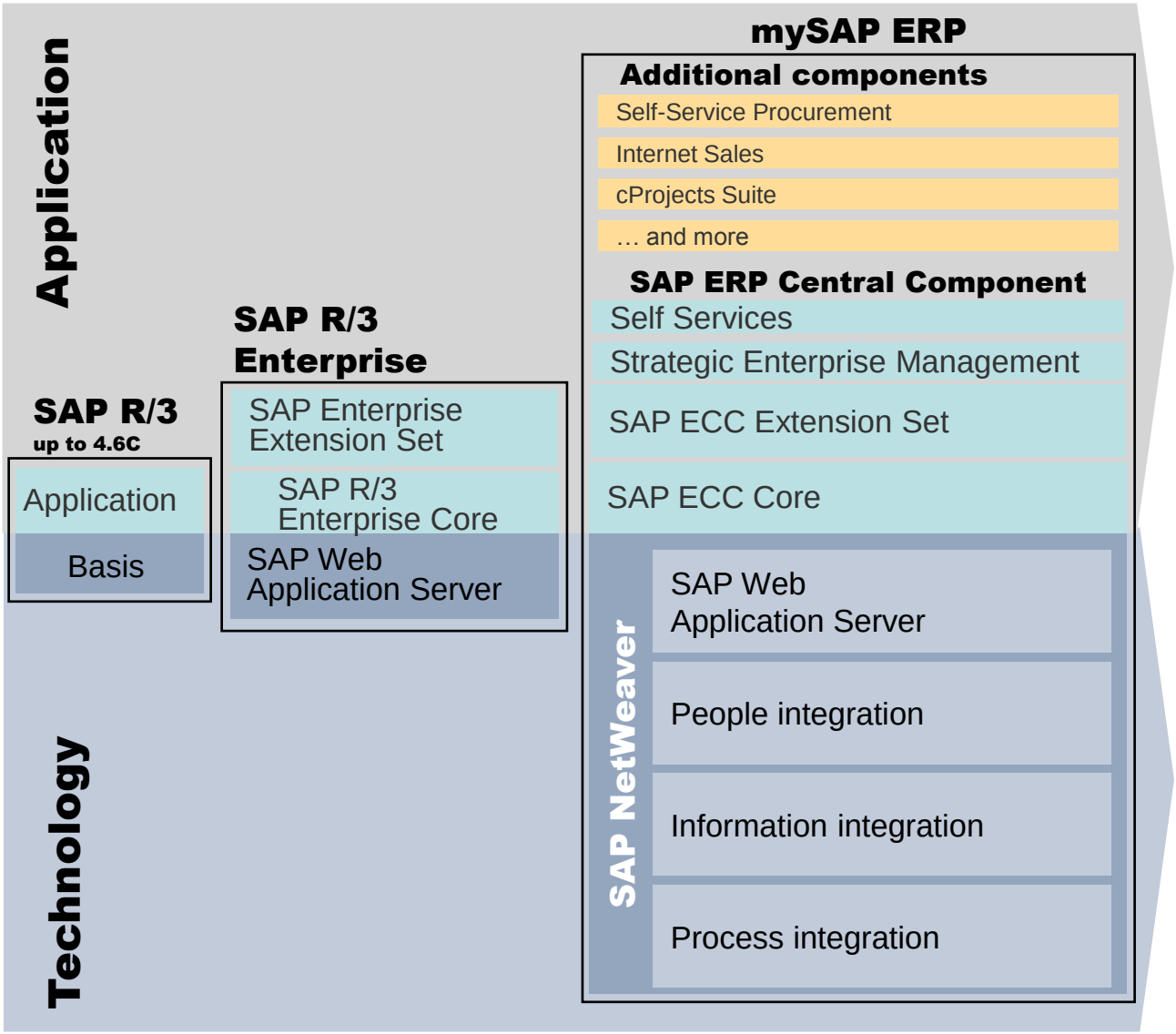
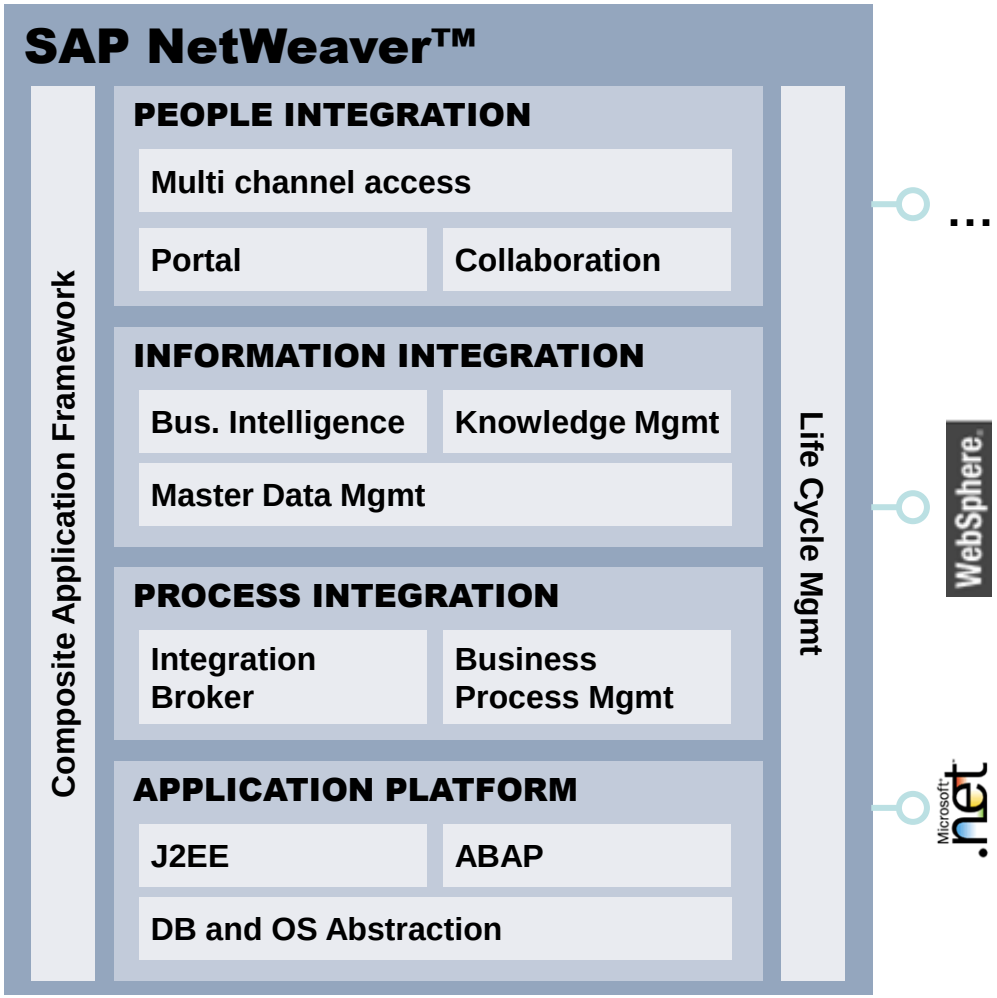
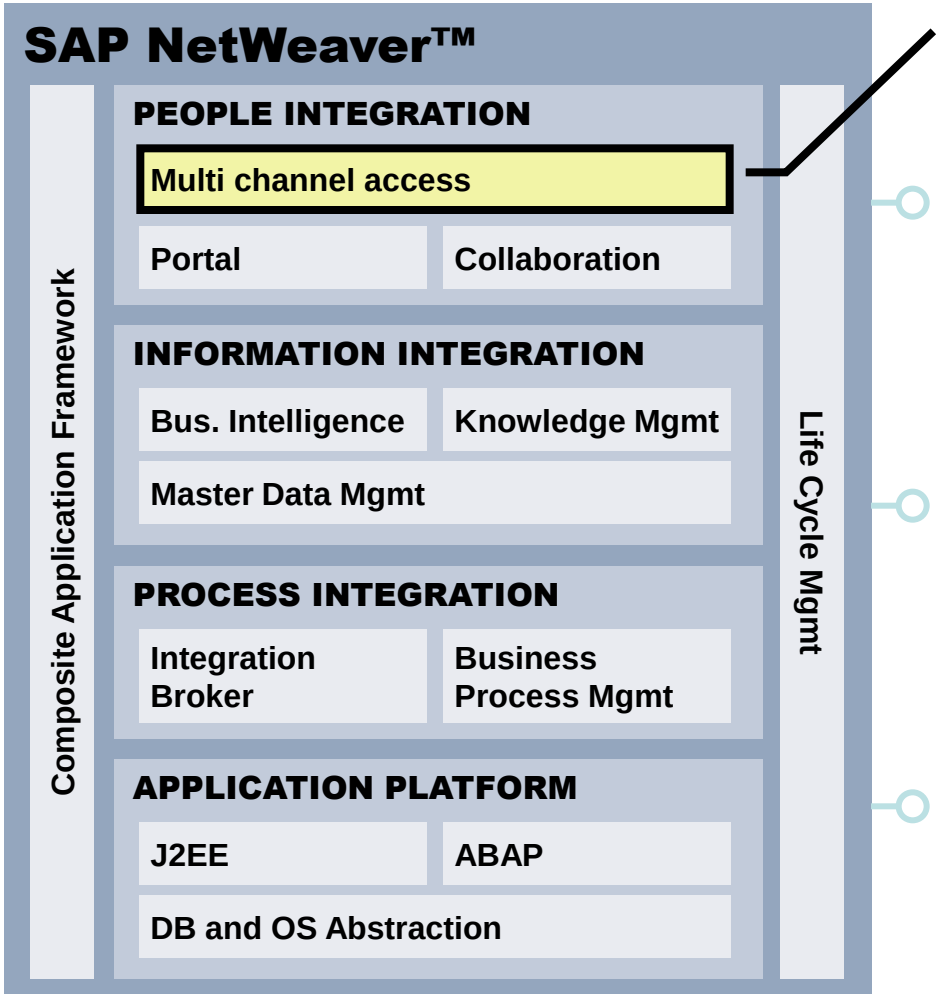




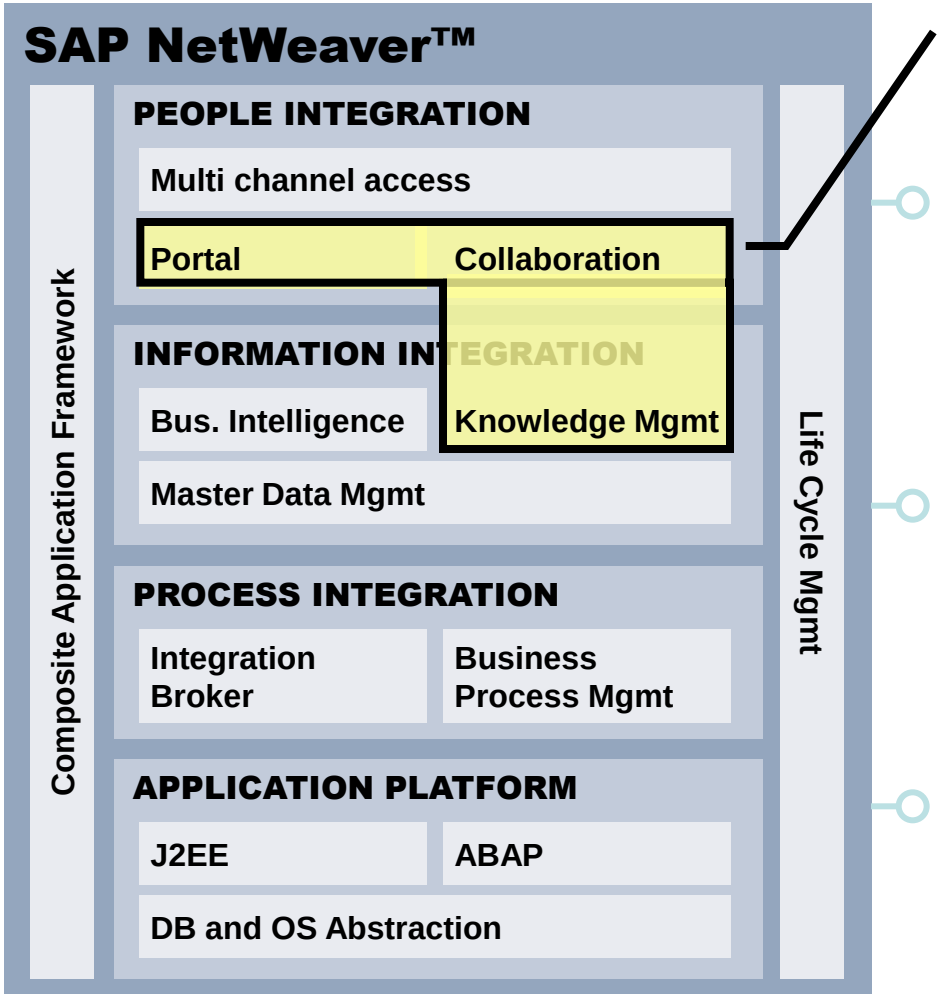
The open integration and application platform for TCO reduction (**Applistructure**)

- Integrate people, information and processes…
- … in 1 hub …
- … across technologies and organizations.
- Enterprise-scale Java and ABAP application platform
- .NET and WebSphere interoperability and extensibility
- Pre-configured with business content
- Adapters to non-SAP



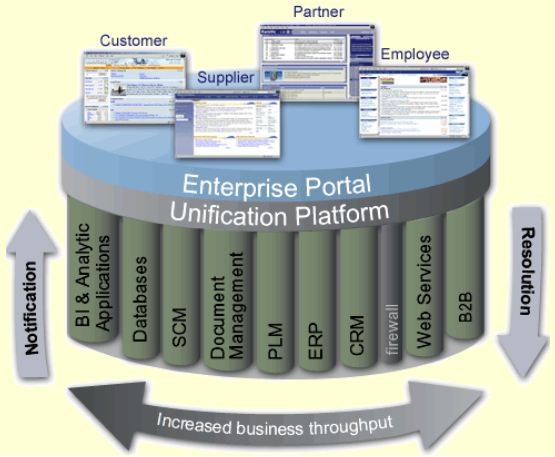
SAP Mobile Infrastructure

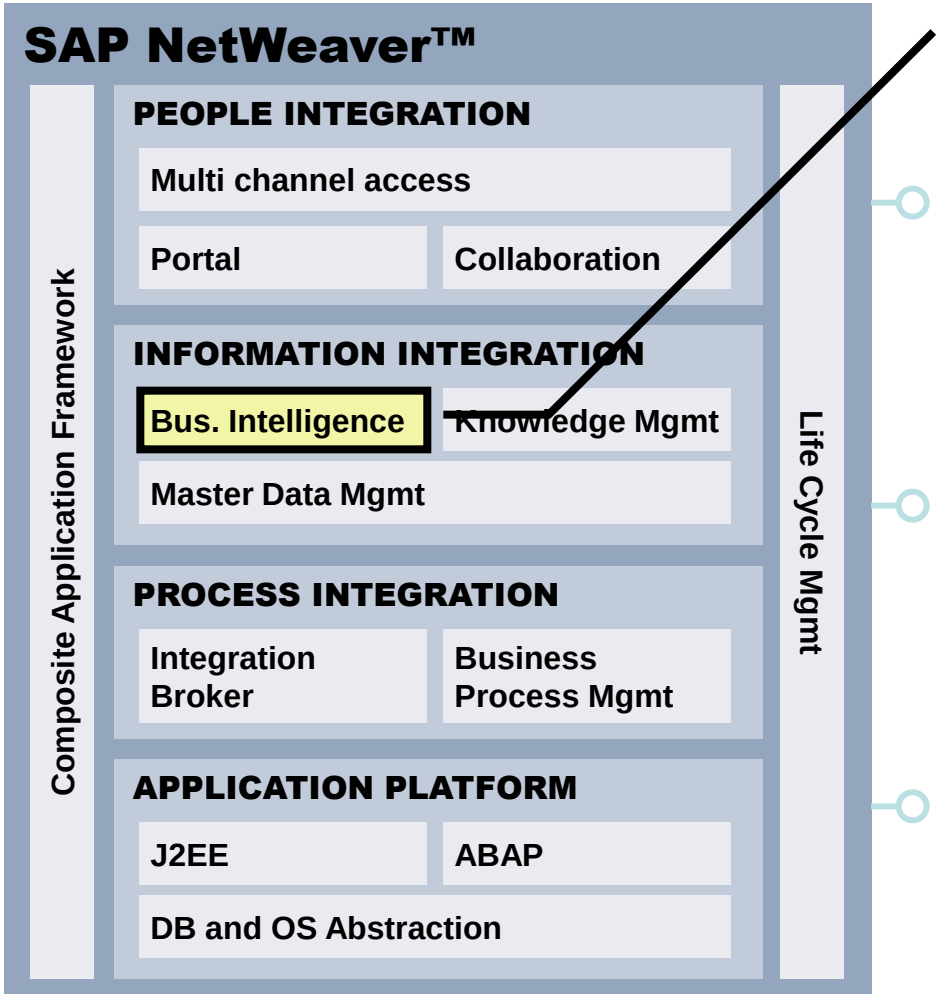
- Enables mobile apps to run disconnected or connected
- Built for handheld devices (Pocket PC, EPOC, Simbian …)
- Browser or native front-end
- Multiple-backend connectivity
- Various mobile business applications available



SAP Enterprise Portal

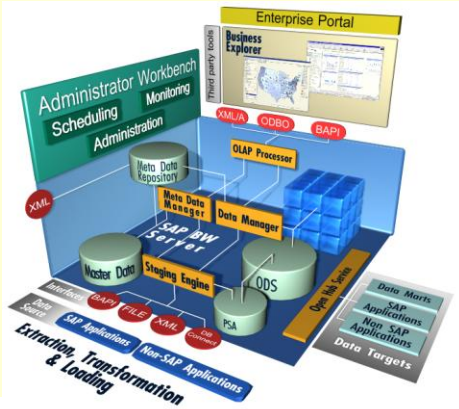
- Platform independence
- Any source/audience, role-based
- Team collaboration (both real-time & asynchronous)
- Authoring, Versioning, Indexing, Searching, … for unstructured information

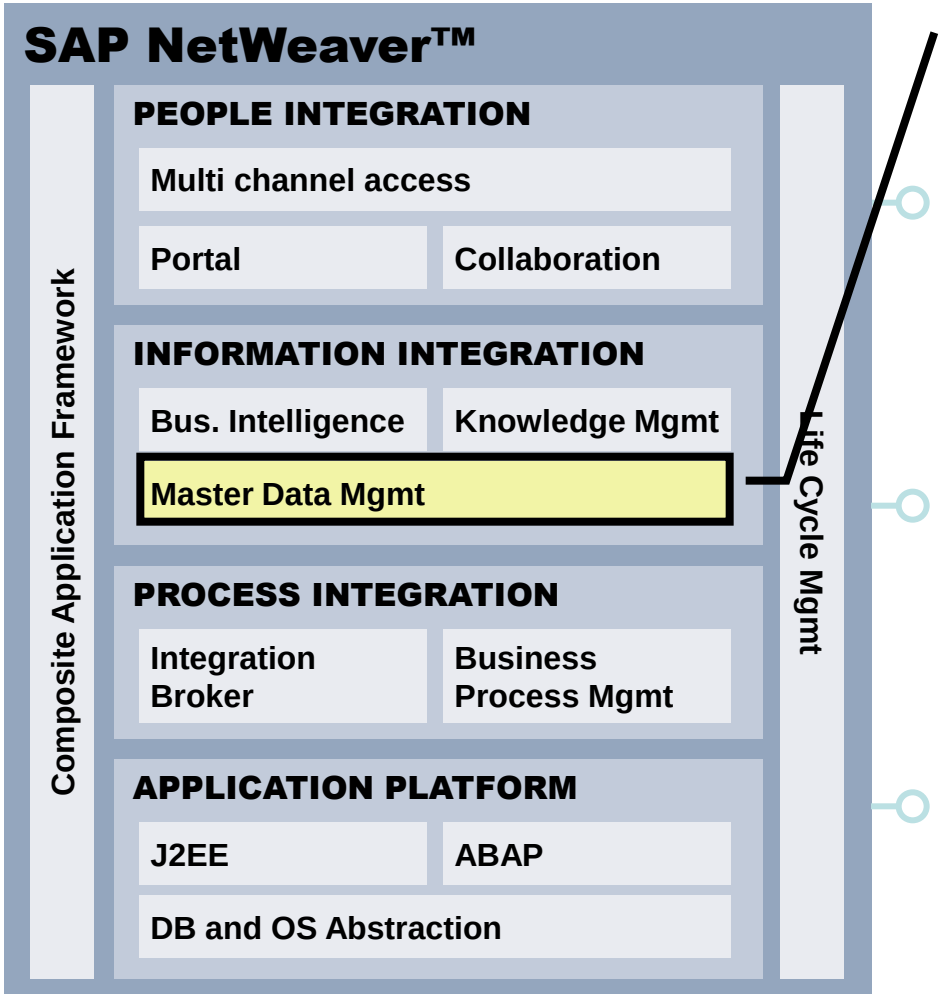




SAP Business Intelligence

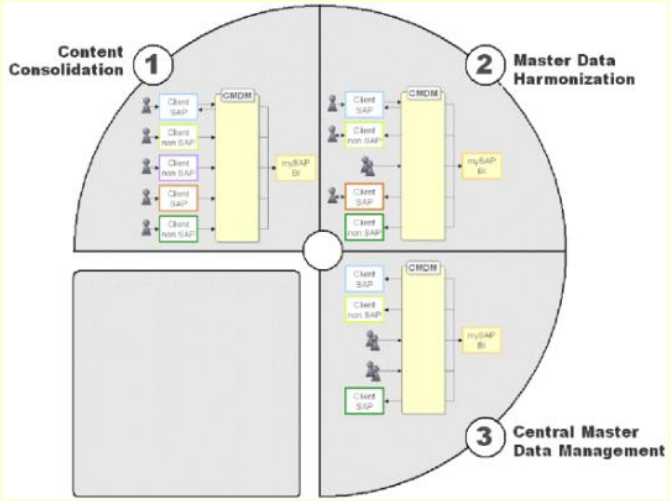
- End-to-end solution for enterprise-wide BI
- Business content for rapid deployment
- Fully integrated with portal
- Open architecture (Crystal, Ascential)
- 95% extract non-SAP data

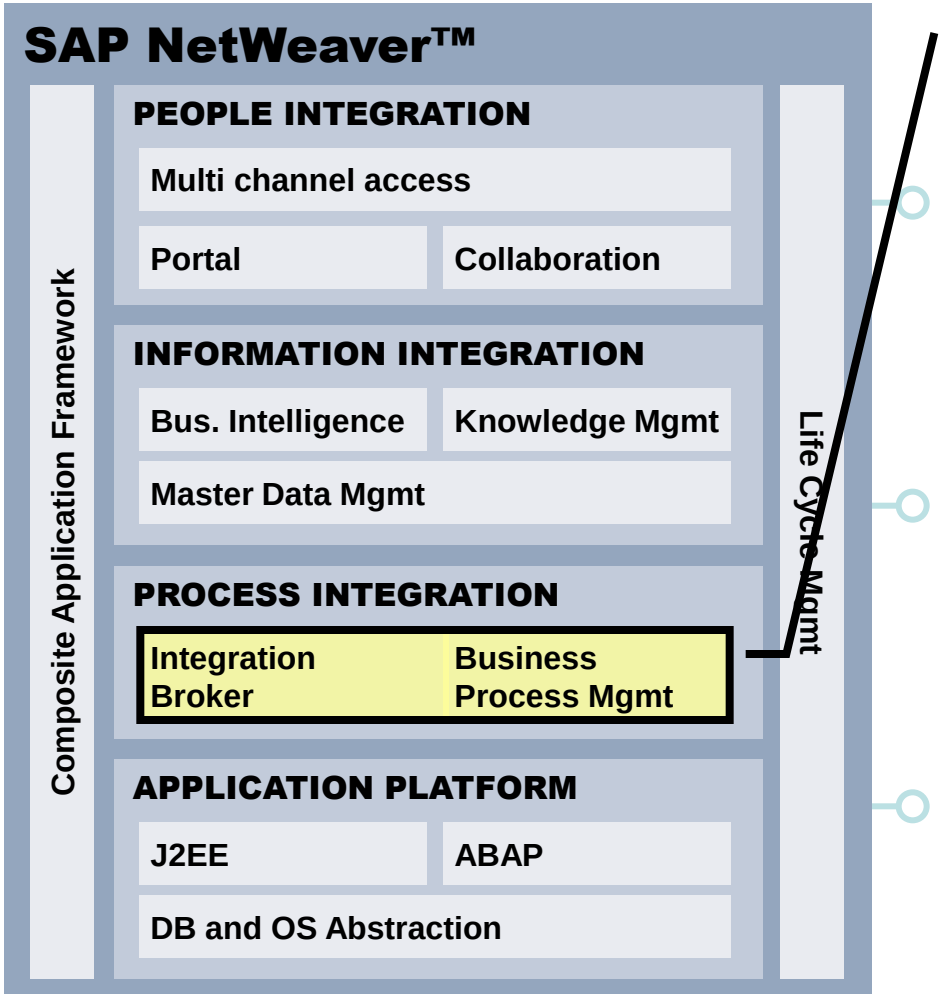




SAP Master Data Mgmt

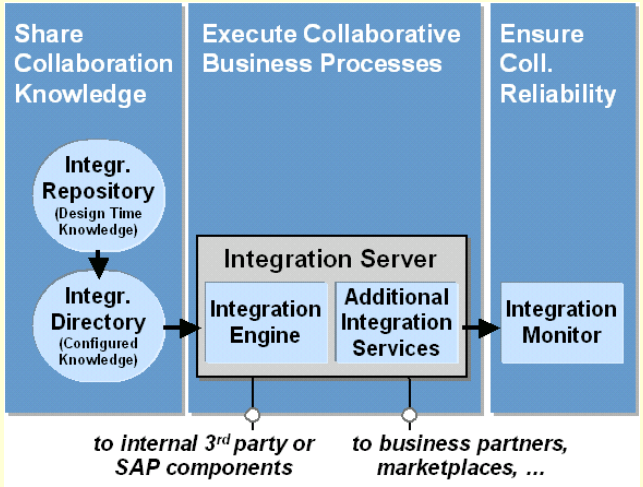
- Information integrity across the business network
- Services and support to consolidate content, harmonize and centrally manage master data, e.g. product data, customer data

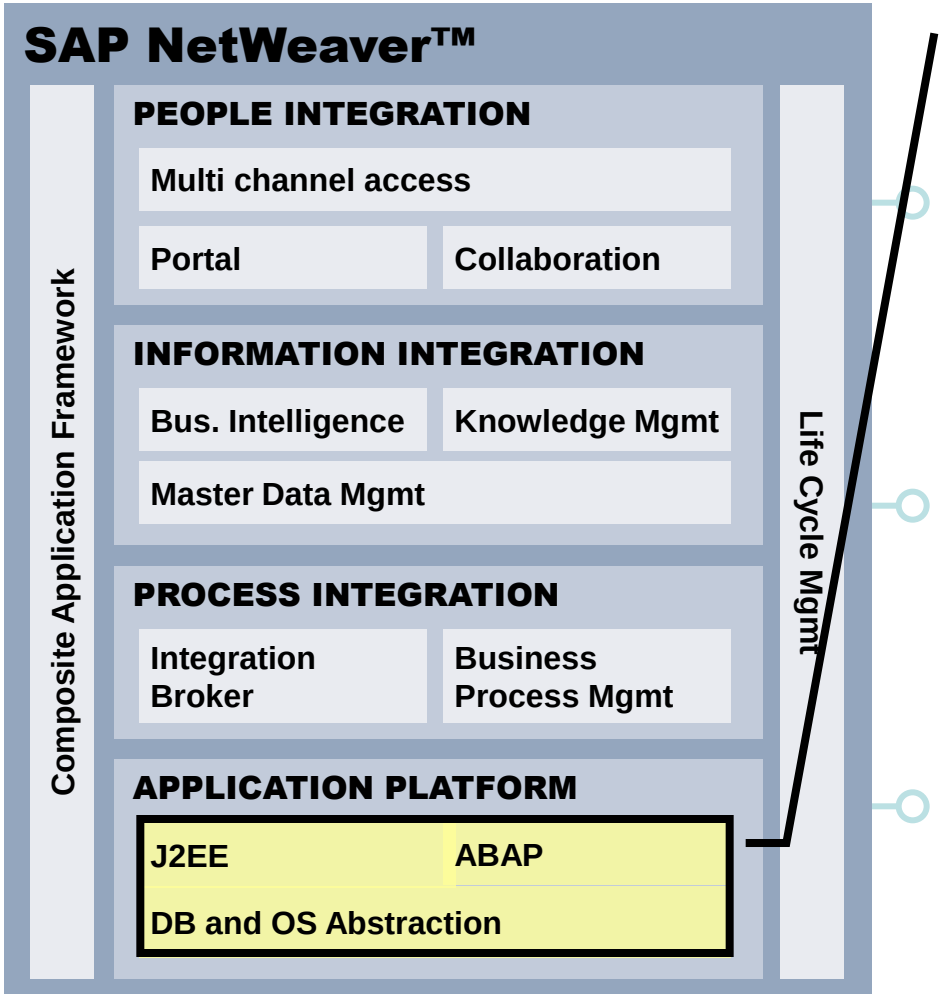




SAP Process Integration

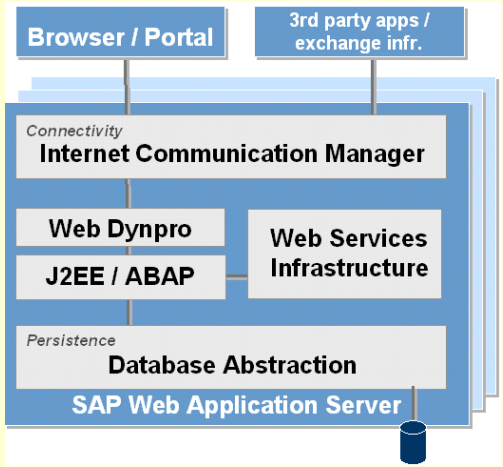
- For both internal and external process integration (with SAP and non-SAP)
- Prepackaged collaboration knowledge
- Ecosystem of non-SAP collaboration content

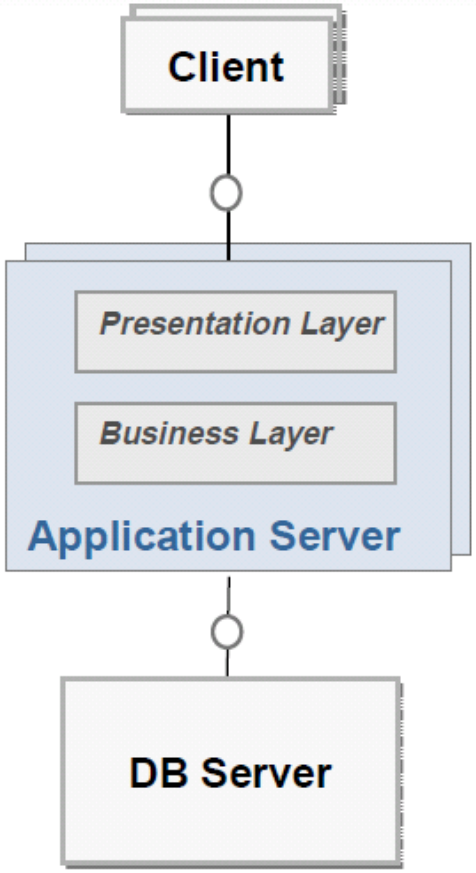




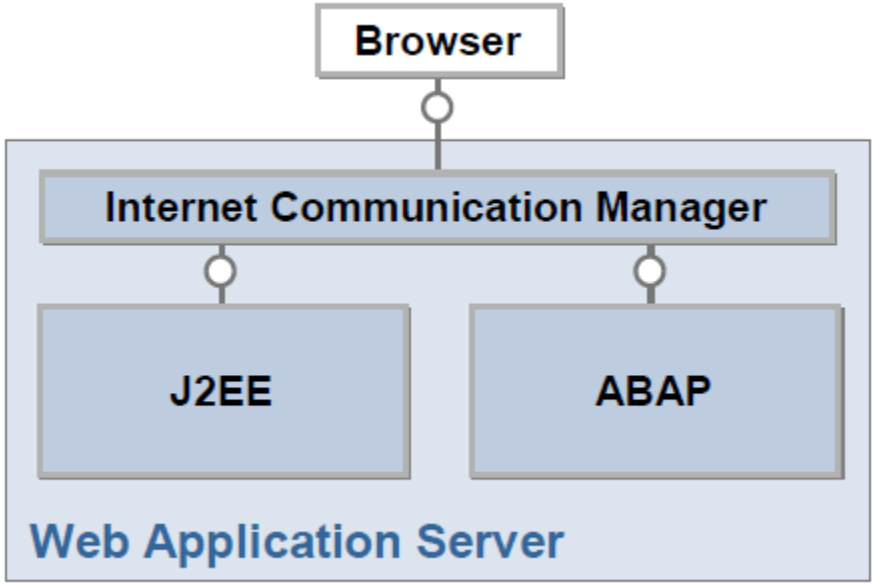
SAP Web Appl. Server

- J2EE compliant Java and ABAP side by side
- Zero footprint UI (Browser)
- Model-driven UI, patterns
- Highly scalable and reliable, advanced caching
- OS and DB independent
- Native Web services



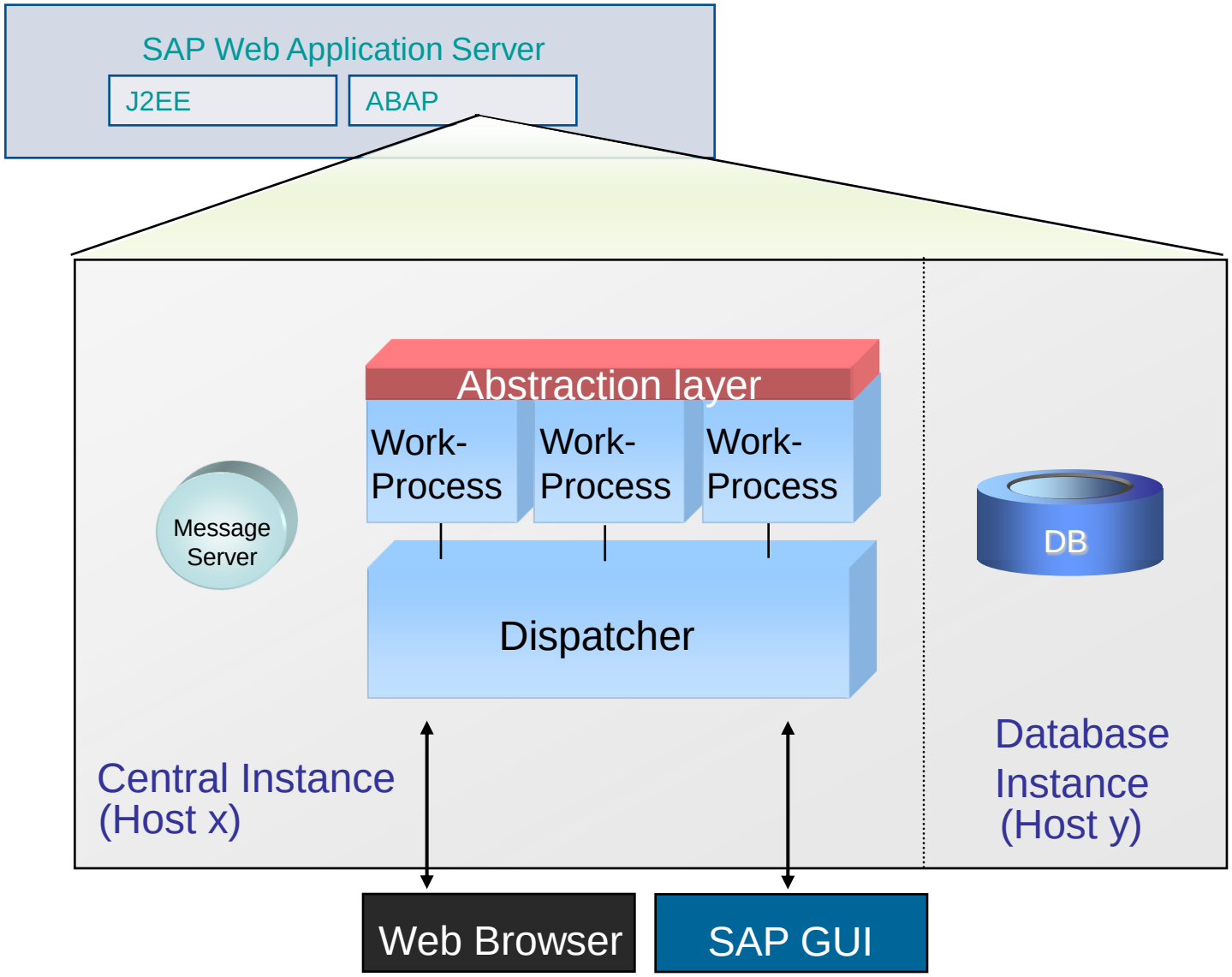


3-Tier Paradigm

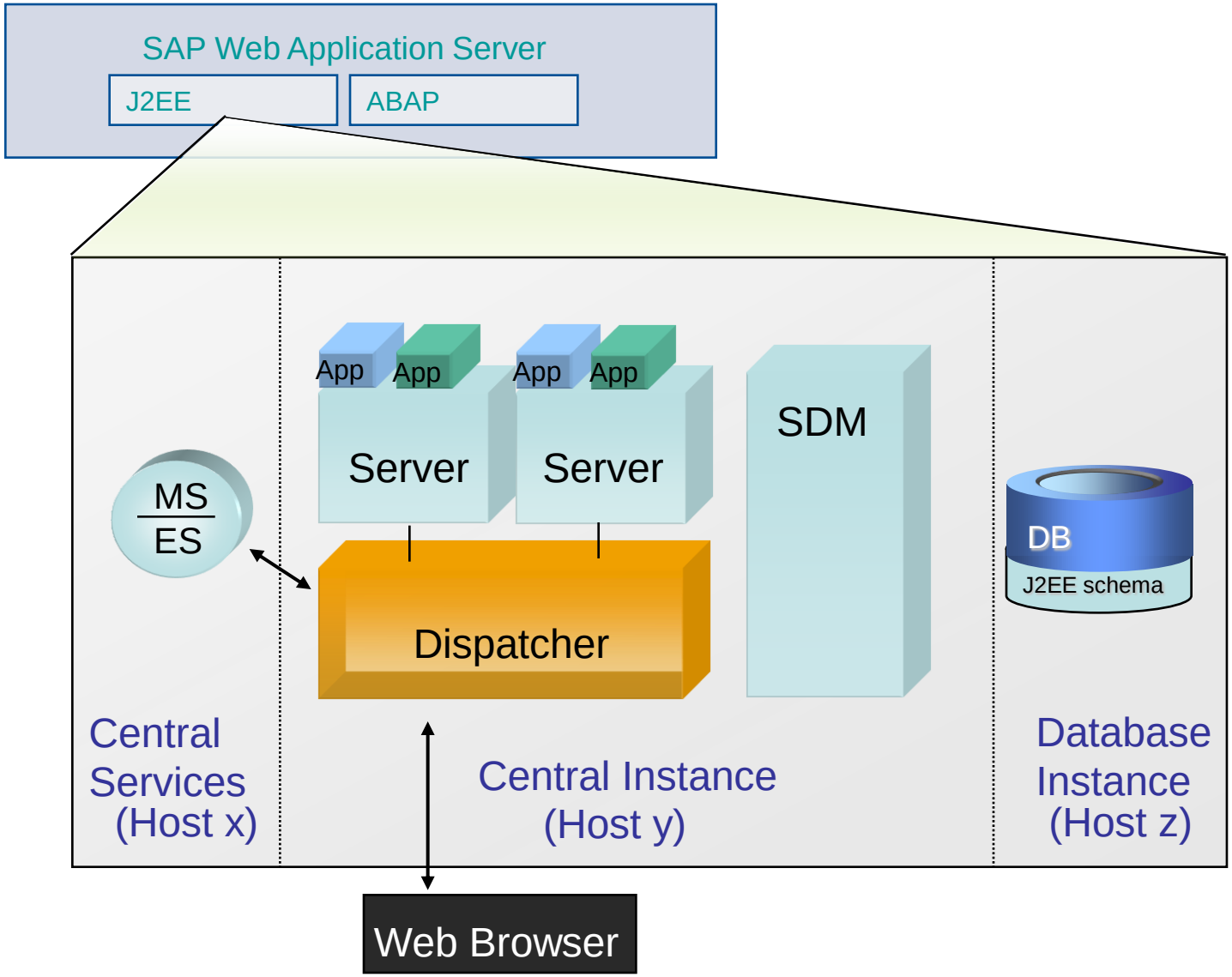


Double stack architecture

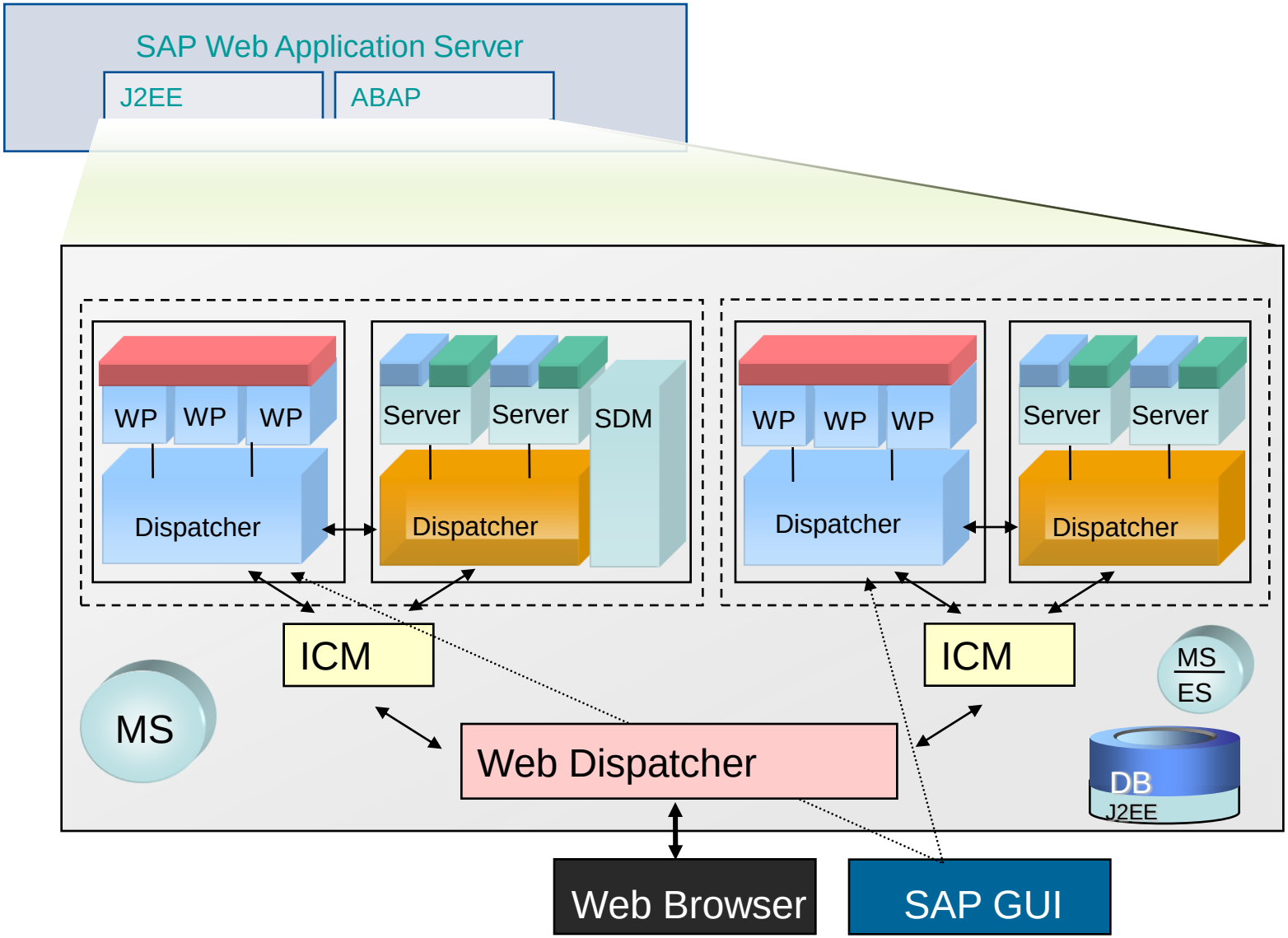
SAP Web Application Server ABAP Stack



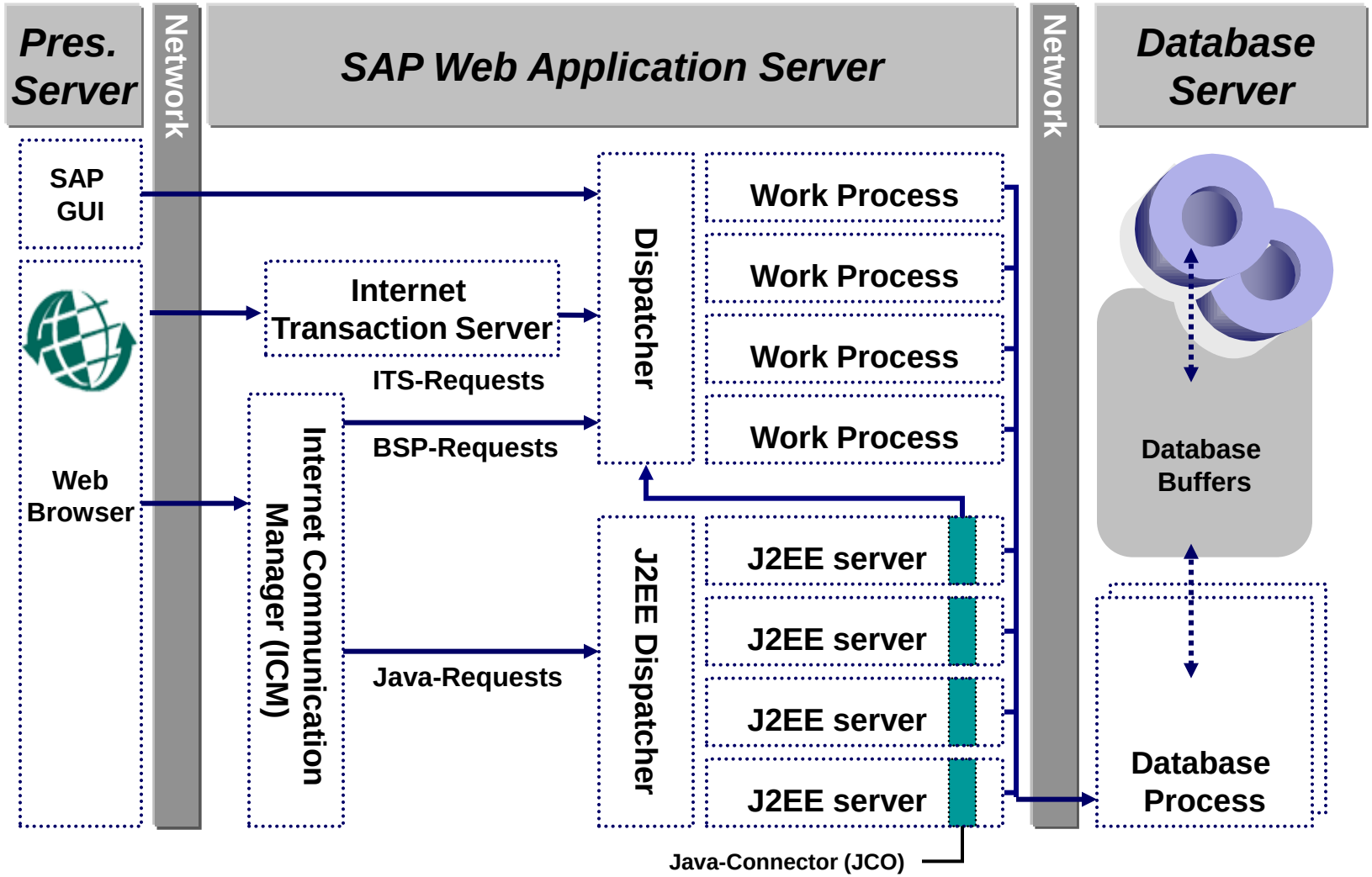
SAP Web Application Server Java Stack



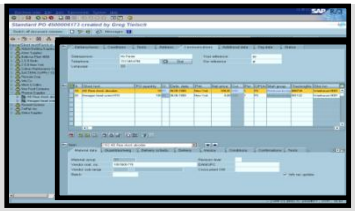
SAP Web Application Server ABAP+Java



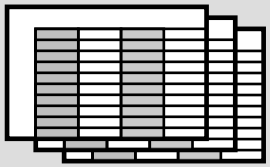
SAP Web Application Server



Performance & Management

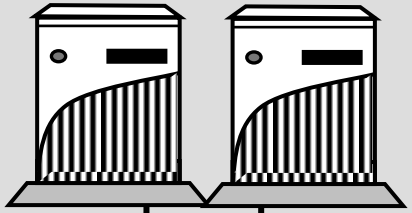


SAP
Web AS

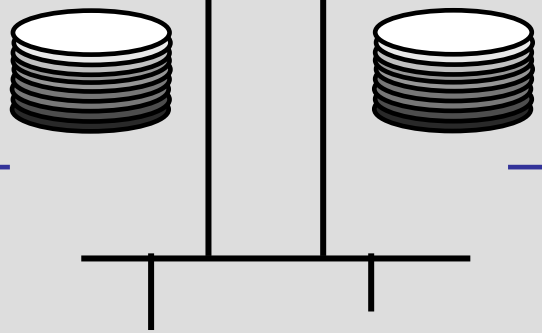


Database

Operating System



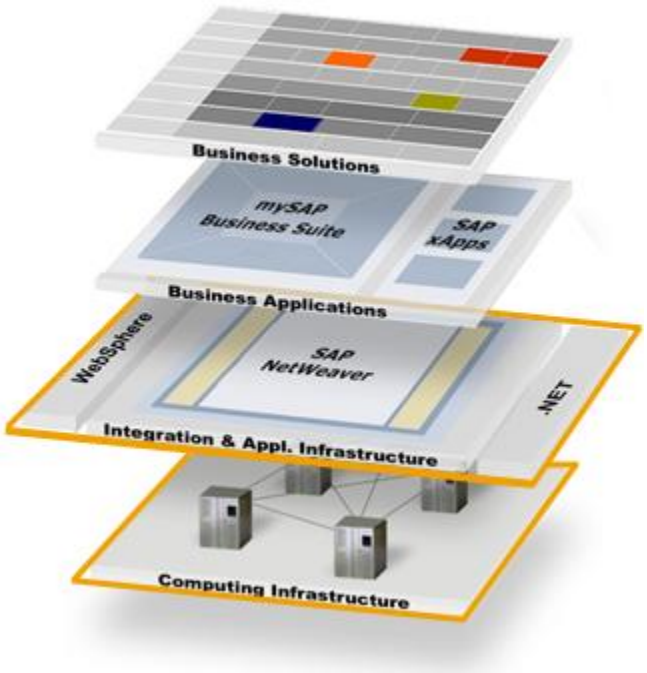
Server

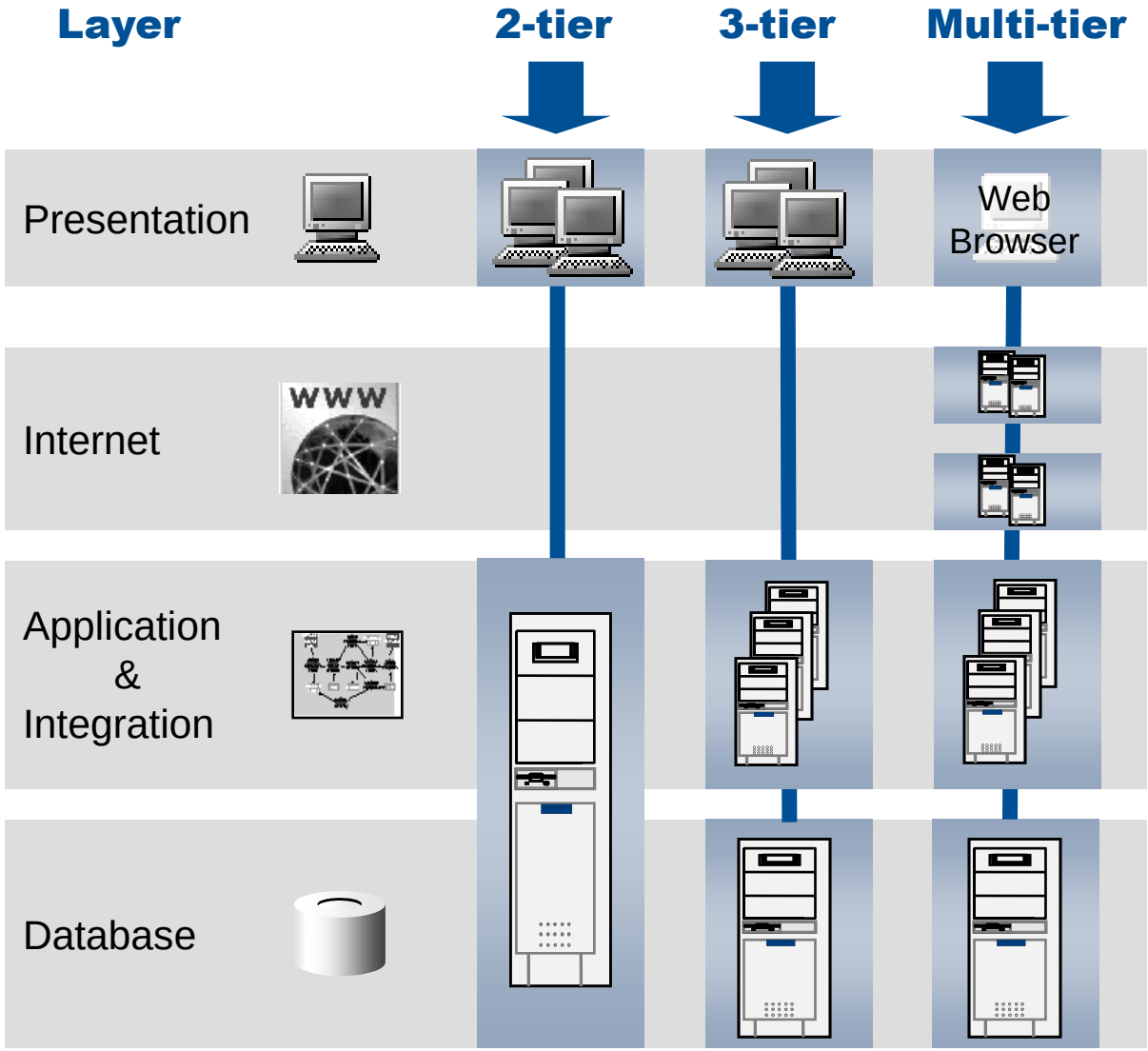


Storage

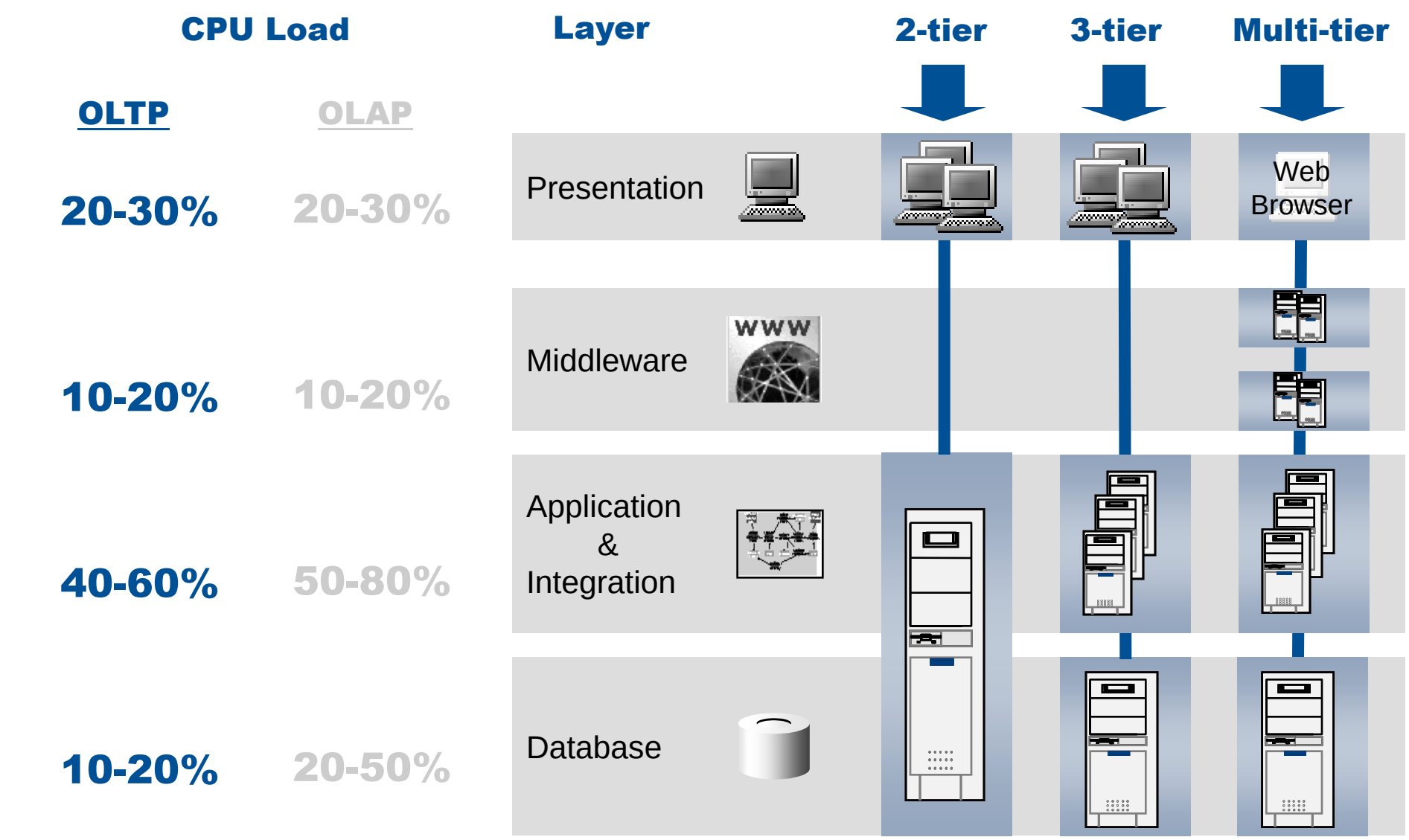
Network

Computing Infrastructure





Load Distribution in OLTP vs OLAP Environments



Hardware Vendors and Operating Systems

Operating System:

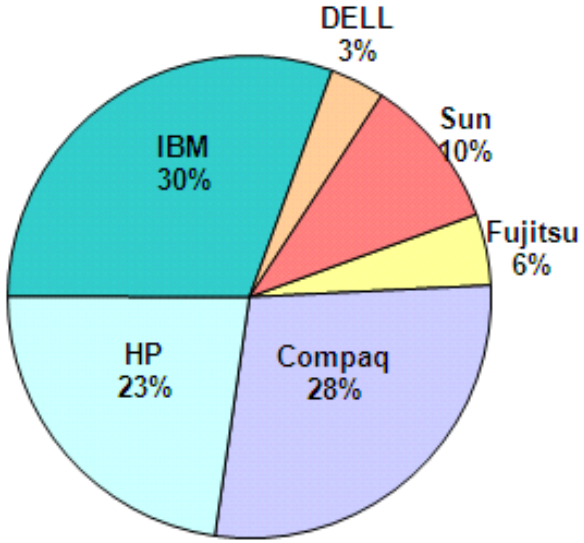
Microsoft: Windows

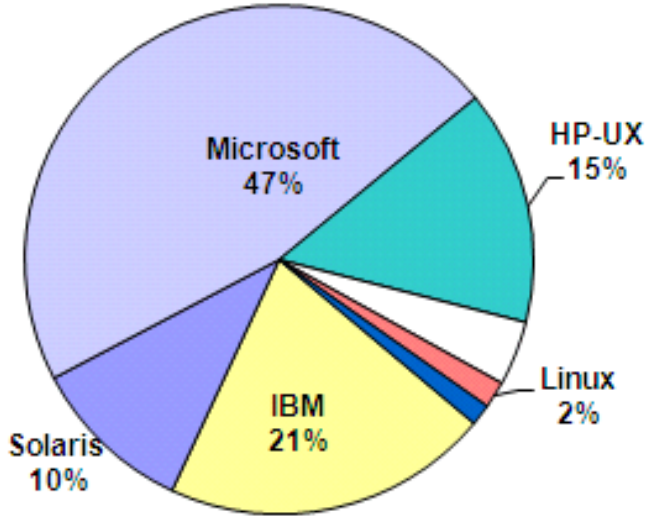
Hardware Vendor: Unix

- HP-UX
- AIX (IBM)
- Solaris (SUN)
- True64-UNIX (Compaq, HP)
- Reliant UNIX (Fujitsu-Siemens)
- DYNIX

IBM: OS/400, OS/390 and z/OS

Open Source: Linux





Which factors influence the hardware performance?

Response time in the application layer depends on

- CPU Speed and capacity
- RAM

CPU speed is classified in SAPS

CPU speed is specially important for „CPU-bound“ processes

- Variant configuration in SAP SD
- Time sheet and payroll run in SAP HR
- Optimizer in SAP APO

CPU speed and RAM are interlinked: The faster the CPU the more RAM it can power

What is a SAPs ?

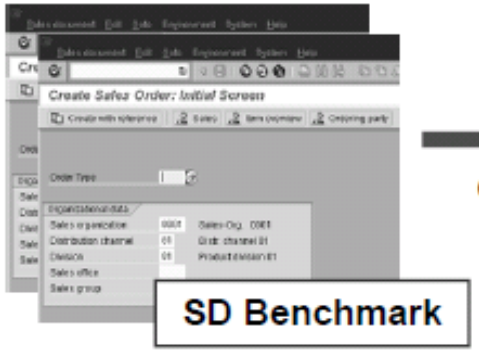
SAP
Application
Performance
Standard

Performance baseline defined via theoretical reference machine*

- Can be adapted to new technologies
- Enables the comparison of different platforms, client/server configurations (2-tier, 3-tier, multi-tier)
- Applicable to SAP Standard Application Benchmarks: business processes underlying the SAP application software do not change significantly

→ Hardware-independent unit of measurement **SAPS** is derived from Sales & Distribution (SD) Standard Application Benchmark

*[Haas & Zorn 1995] *Haas, M.; Zorn, W.*: Methodische Leistungsanalyse von Rechensystemen. Reihe: Handbuch der Informatik 2.6,Oldenbourg, München, Wien, 1995.



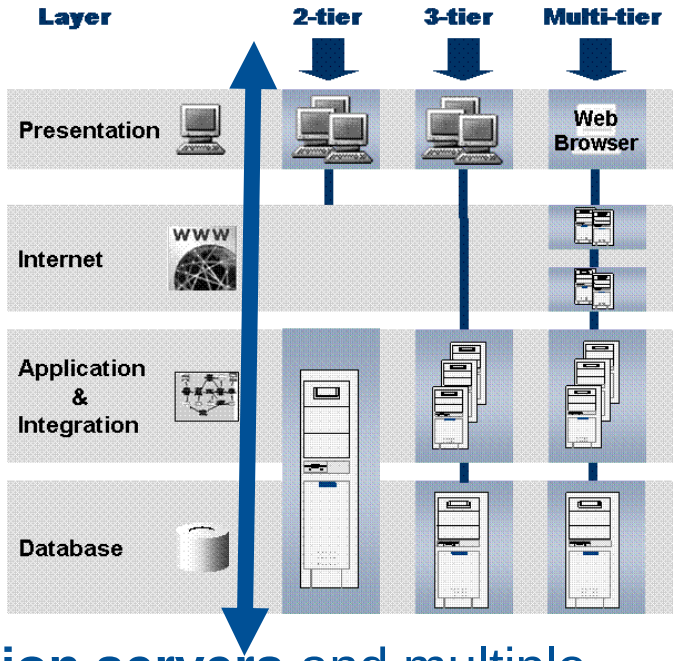
SD Benchmark

2,000 fully processed order line items/hour**

100 SAPS

** ≙ **6,000 dialog steps and 2,000 postings *or* 2,400 SAP transactions**

Vertical Scalability of Computing Infrastructure



One-tier

- Laptop demo system

Two-tier

- Central installation (database and application part on one physical server), multiple presentation servers

Three-tier

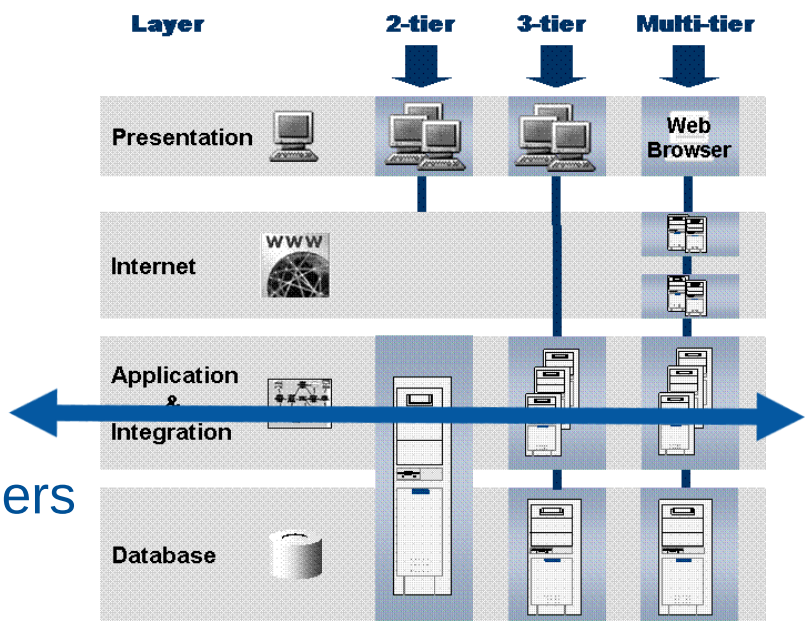
- One database server, **multiple application servers** and multiple presentation servers

Multi-tier

- One database server, multiple application servers, multiple Web servers, multiple presentation servers

Presentation Layer

- More than 47,000 very active users connected to one database have been tested



Web Layer

- More than ten thousands of hits/sec
- 9 servers at one of our largest customers

Application and Integration Layer

- Up to 161 application servers have been tested successfully

Database Layer

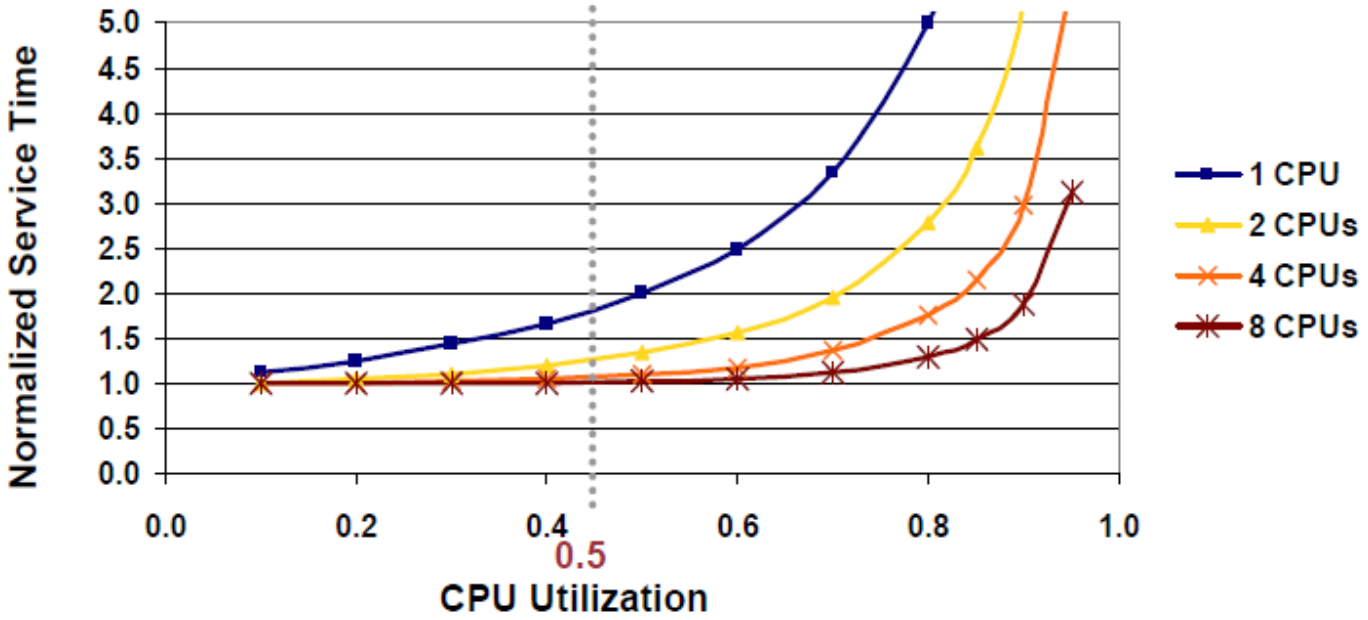
- Scalability through architecture of the database server
- **More than 120 CPUs and more than 10 TB database size**
- Scalability through parallel databases
- Scalability through components

Queueing Theory: Response times and utilization

Even with stable individual processing times, the response time depends on the utilization

Response time increase at 50% system load:

- 100% for 1 CPU
- 10% for 4 CPUs



Database Systems for SAP Operations

Oracle > 60 %

SQL Server > 15 %

SAP DB

IBM DB2 Universal Database > 10 %

- For OS/390 and z/OS
- For AS/400
- For Unix and Windows
- DB2/DB4/DB6 in SAP„slang“

Informix

- IBM acquired Informix database business in 2001
- IBM commitment for support and enhancement of Informix product line

Which factors influence the DB performance

HW

- Disk I/O (SAN performance problems)
  Thresholds for the average wait time for Read and Write Cached disks such as the Symmetrix from EMC or VSS from IBM:

Event	Critical
db file sequential read	> 10 ms
log file sync	> 15 ms
buffer busy waits	> 15 ms

- Add new HW resource

Administration

- Buffering of tables / DB Param.
- Index creations
- Table partitioning

Behaviour

- Table or index reorganization
- Archiving to reduce data amount
- Re-schedule load across time

- Custom writing / number of data transfer/ use internal table

Top common performance mistakes to watch out for:

1. Don’t write messages to the console. Use proper logging/tracing API and log/trace level definitions.
2. Watch out for Memory Leaks
3. Implement data caching where useful.
4. Use good Table, Index and SQL design
5. Avoid having many RFC calls
6. Avoid having many http roundtrips per web-page
7. Avoid Java Garbage Collection being more than 1 to 3% of CPU time.
8. Keep locking/synchronization to an absolute minimum.
9. Keep blocking (synchronous) calls short (RFC, database).
10. No performance goals defined as part of product design phase

SAP Benchmark versus Real World Examples

SAP Benchmark

Presentation Layer

- 47,000 active users connected to one SAP system have been tested
- 14 Mio transaction steps per hour
- 2 seconds avg. response time

Application Layer

- Up to 161 application servers have been tested successfully
- ~ 240,000 SAPS

Database Layer

- Scalability through SMP (symmetrical multi-processor) architecture of the database server
- More than 120 CPUs
- More than 10 TB Database size

Internet Transaction Server and Web Server

- More than 100 hits /sec

Homepage:

http://service.sap.com/benchmark

Real World Examples

Presentation Layer

- >5,000 active users
- >25,000 low activity users
- >250,000 transaction steps per hour
- 400 milliseconds avg. response time

Application Layer

- The highest number of physical application servers at customer installations is less than 30
- ~100,000 SAPS

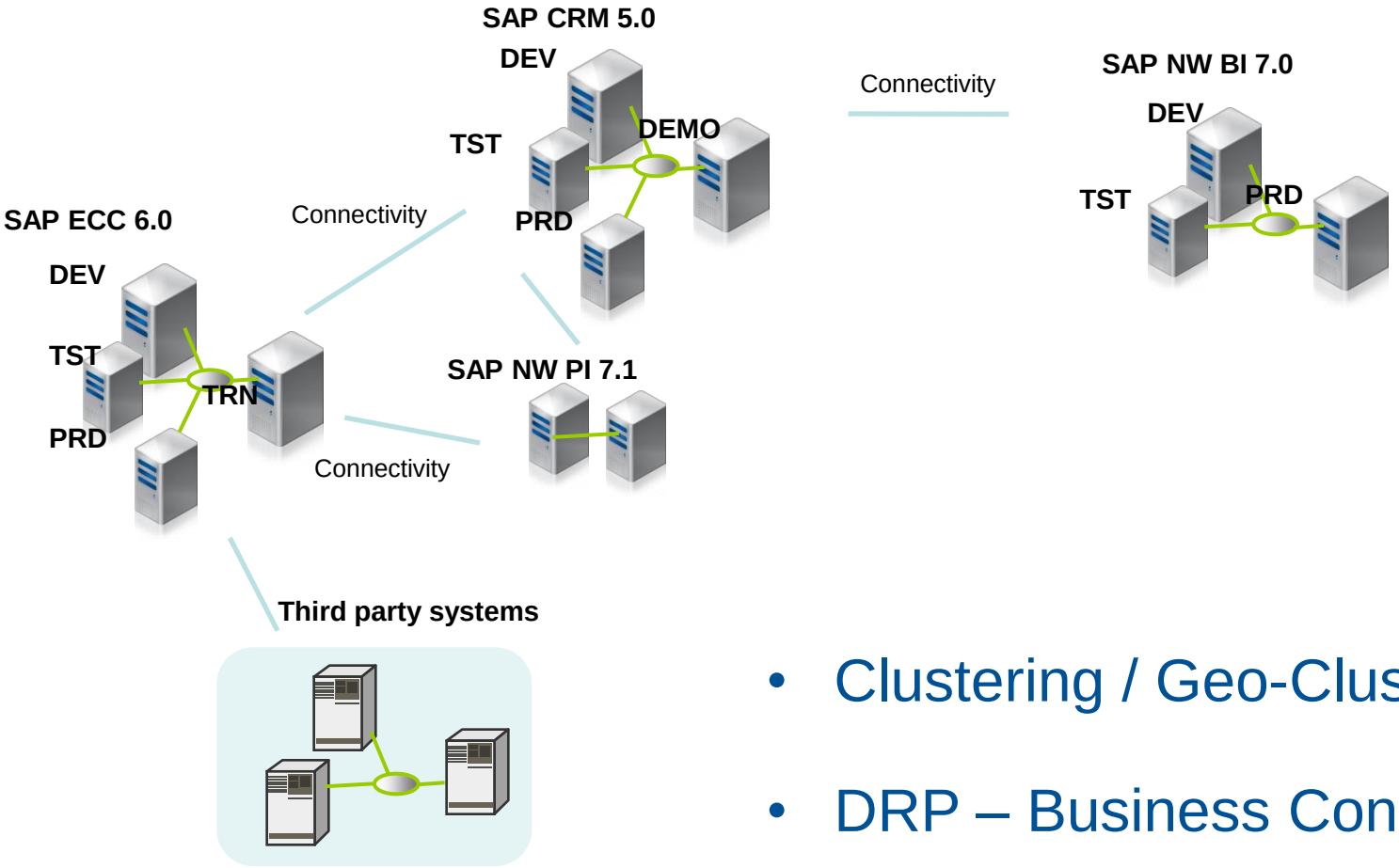
Database Layer

- Scalability through SMP (symmetrical multi-processor) architecture of the database server
- 64 CPUs
- More than 6 TB Database size

Internet Transaction Server and Web Server

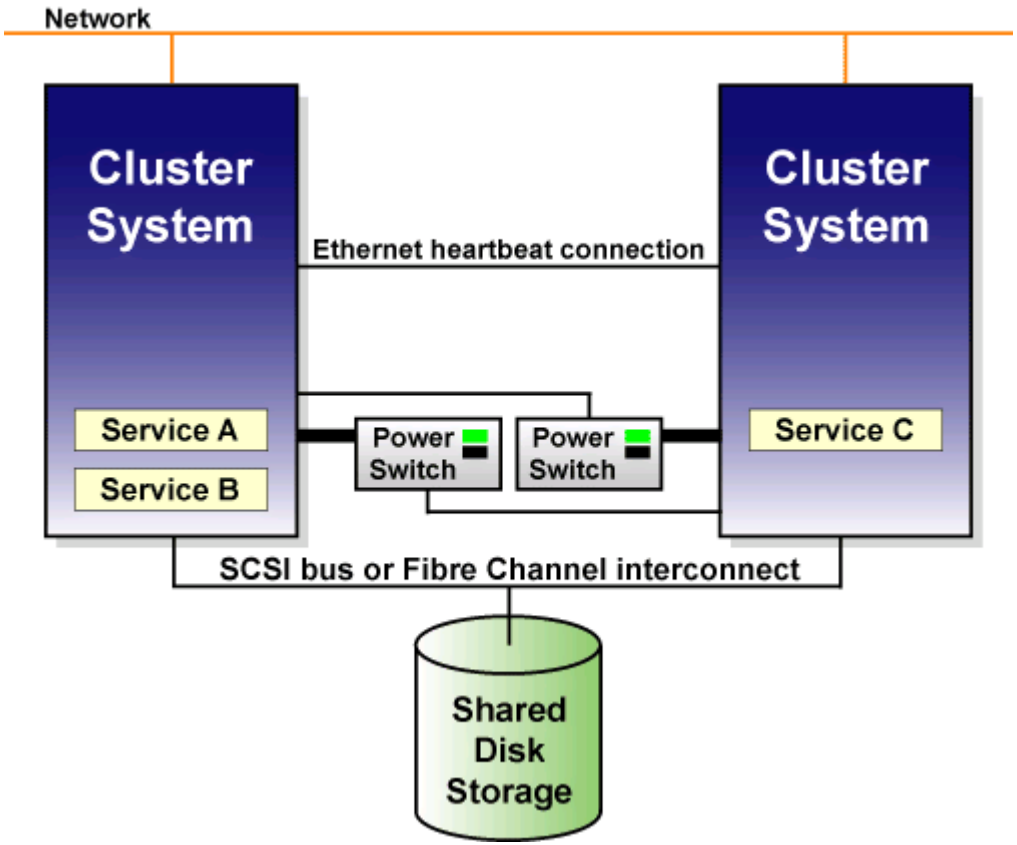
- 50,000 hits/hour

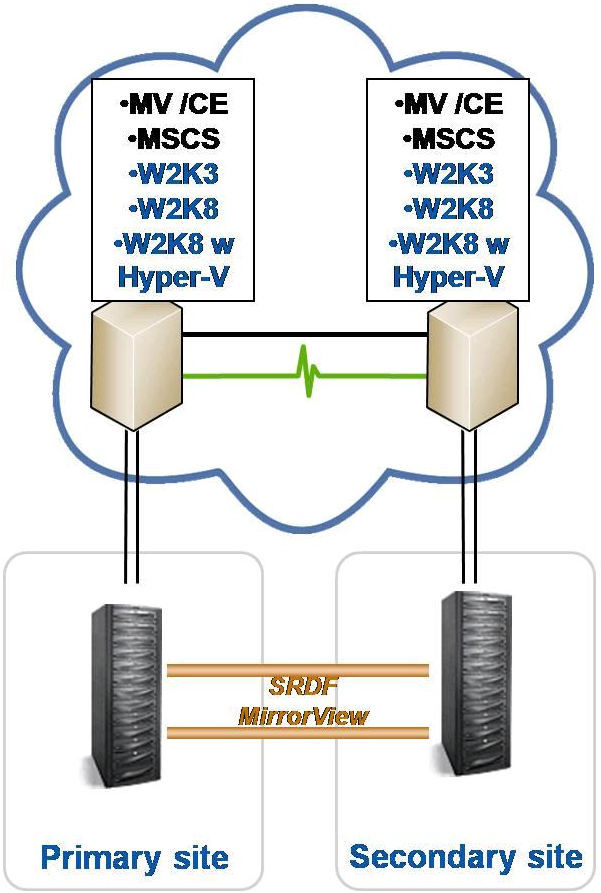
Customer Landscape



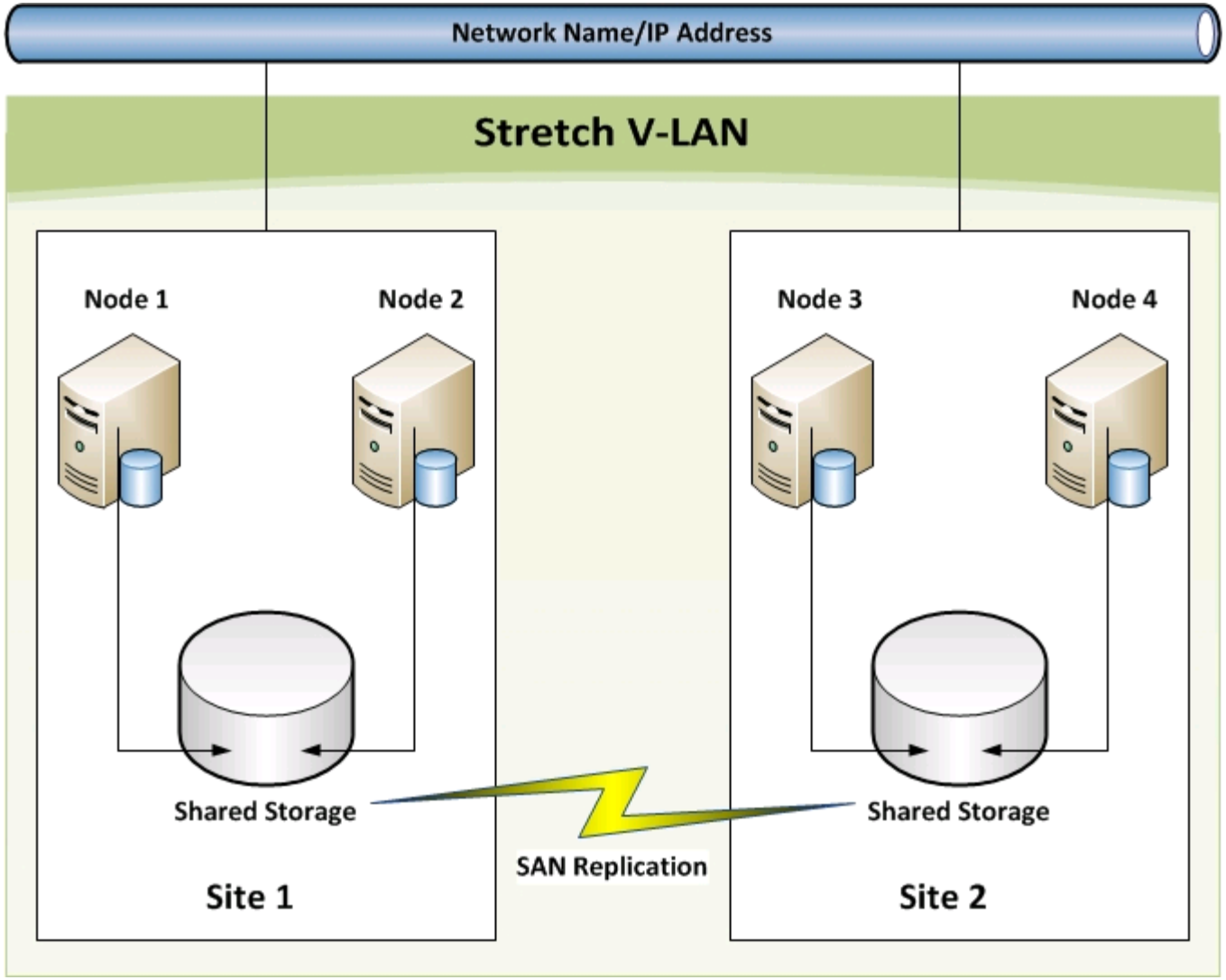
- Clustering / Geo-Clusters
- DRP – Business Continuity

Clustering / Geo-clustering

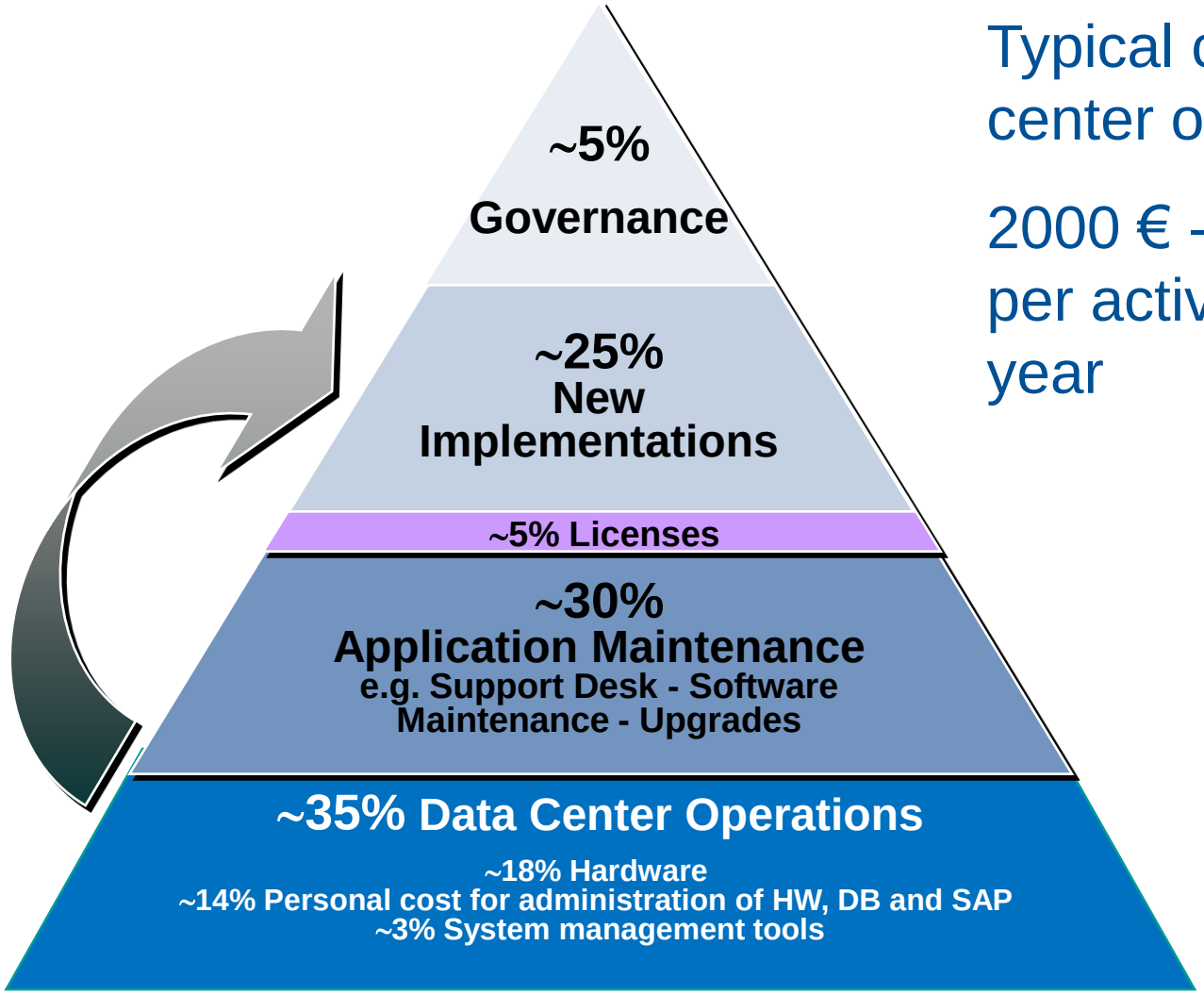




DRP – Business Continuity



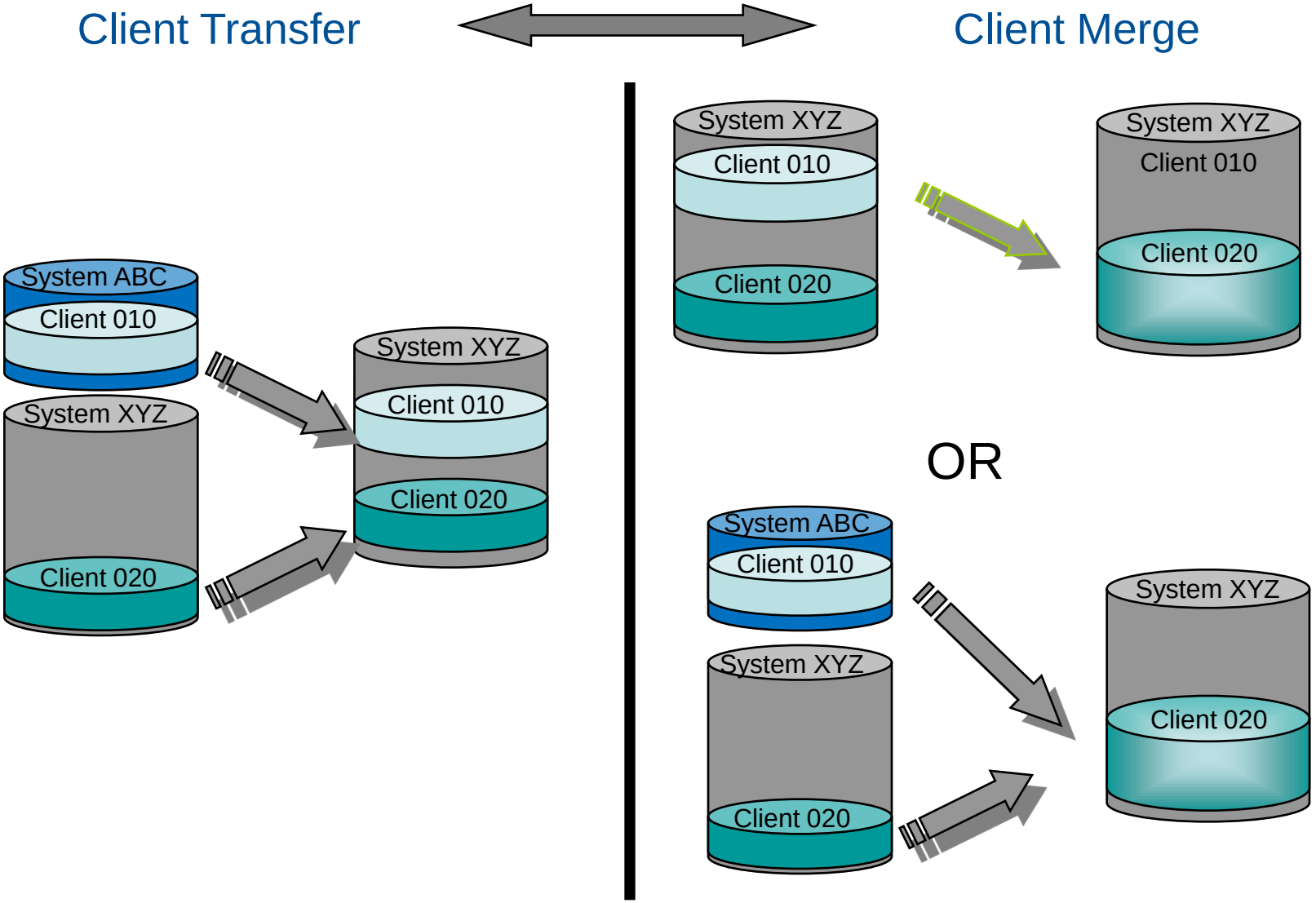
Total Cost of Ownership for SAP Operations



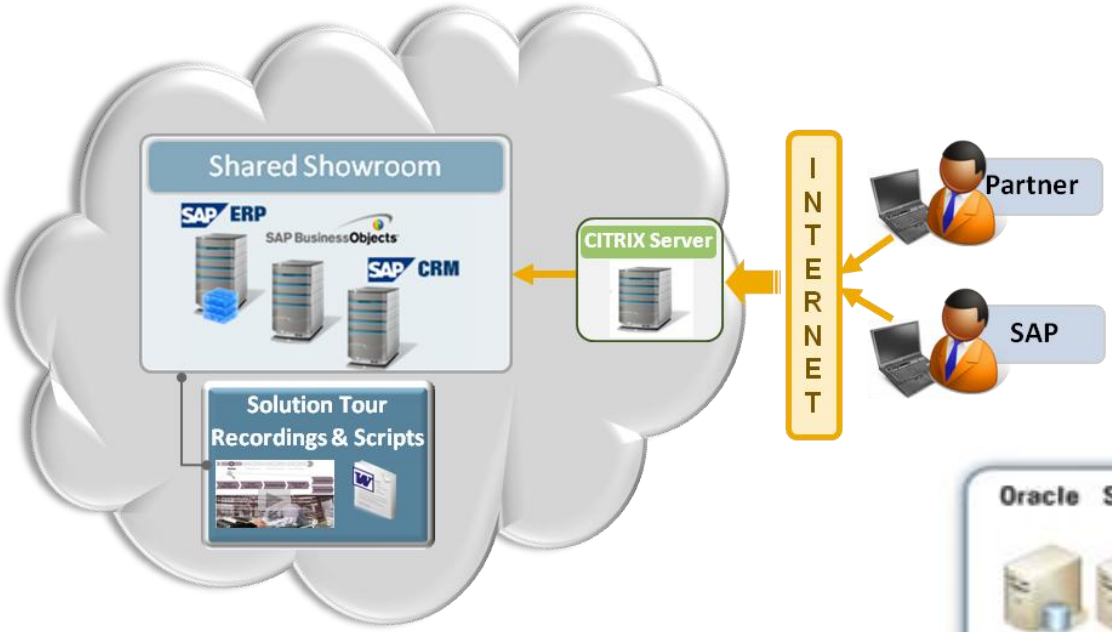
Typical cost for data center operations:

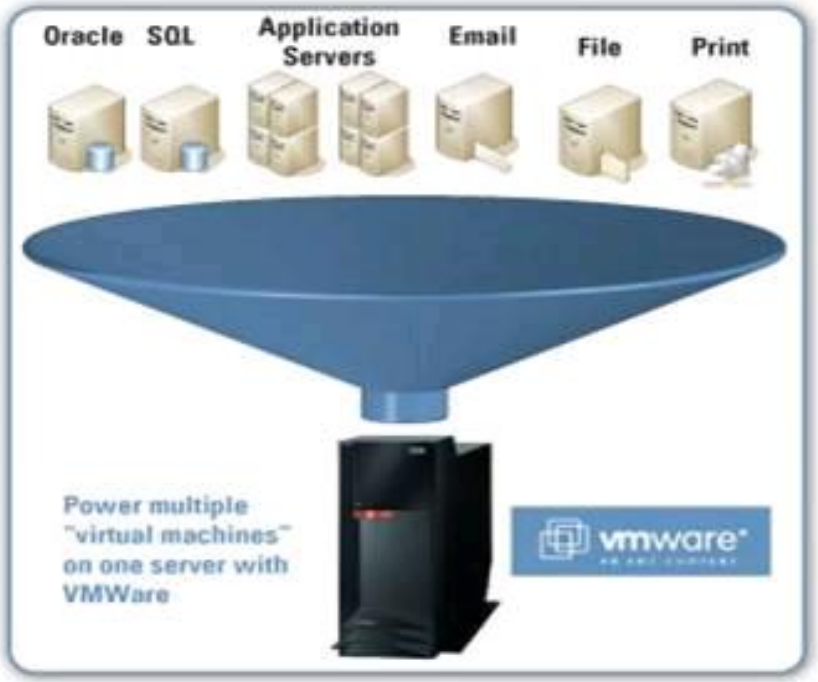
2000 € - 8000 €
per active user and year

Current waves: System Consolidation

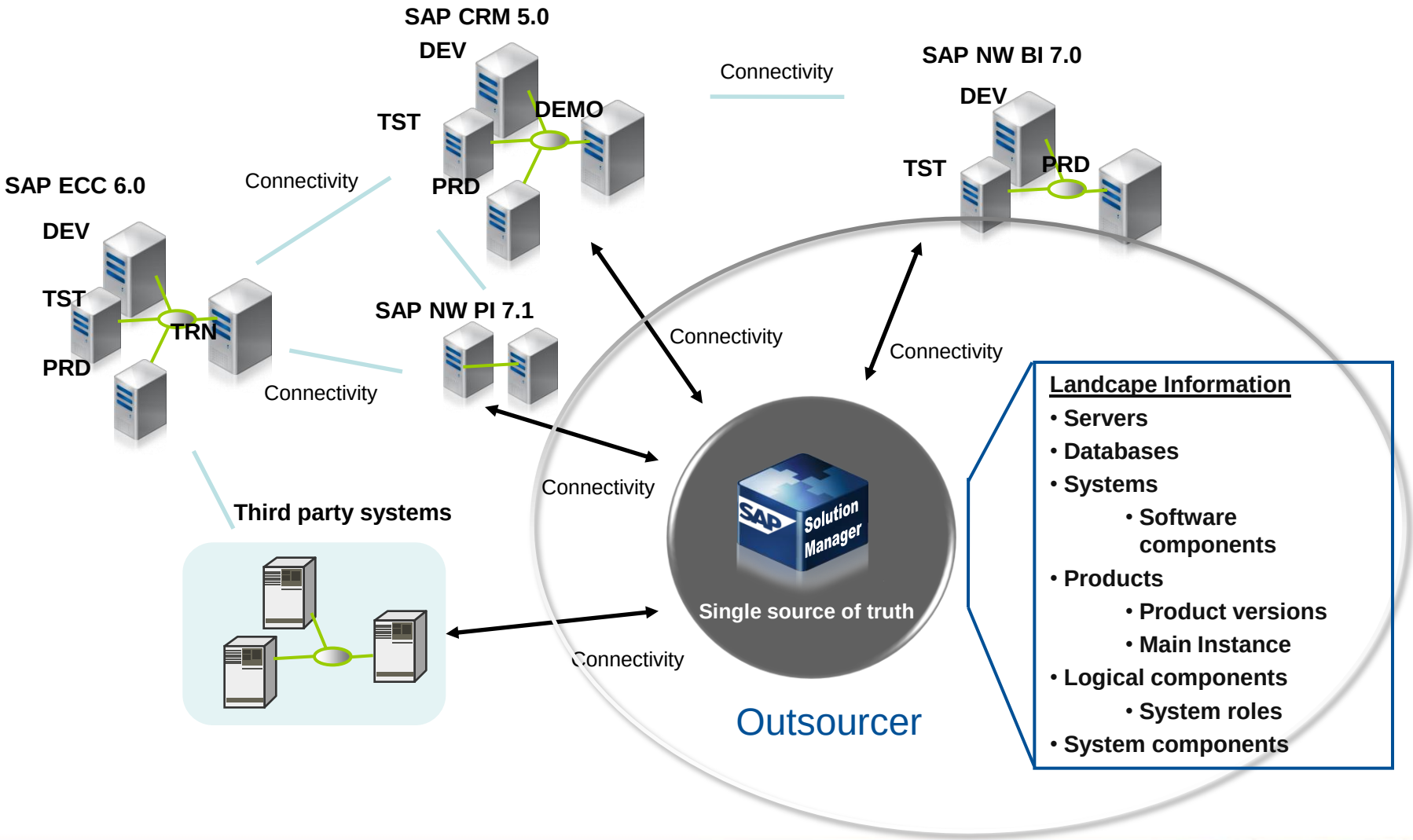


Current waves: the cloud





Outsourcing for Customer Landscape



“Leverage Solution Manager capabilities to provide value added services”

Active monitoring and diagnosis of the SAP infrastructure

1) Systems Availability & CCMS alerts
2) Root Cause Analysis
3) Java performance and runtime analysis
4) Interface Monitoring through PI RWB

Advanced reporting

1) Service Level Report
2) Business Process Monitoring
3) Customer specific reporting

The Challenge: Monitoring a Landscape

An administrator's nightmare:

- Performance of crucial transactions is very low.
- Main components become unavailable.
- Business processes are delayed.

Action required:

- Locate the problem.
- Find out its cause.
- Tackle the problem.
- Prevent this from happening again.

Proactive Monitoring vs. Reactive Monitoring

Proactive Monitoring

Proactive Monitoring tries to avoid critical situations before the occurrence -> To be reminded of the necessary monitoring tasks, interactive work lists are needed (Alert Graphic). How can Solution Manager Help you ?:

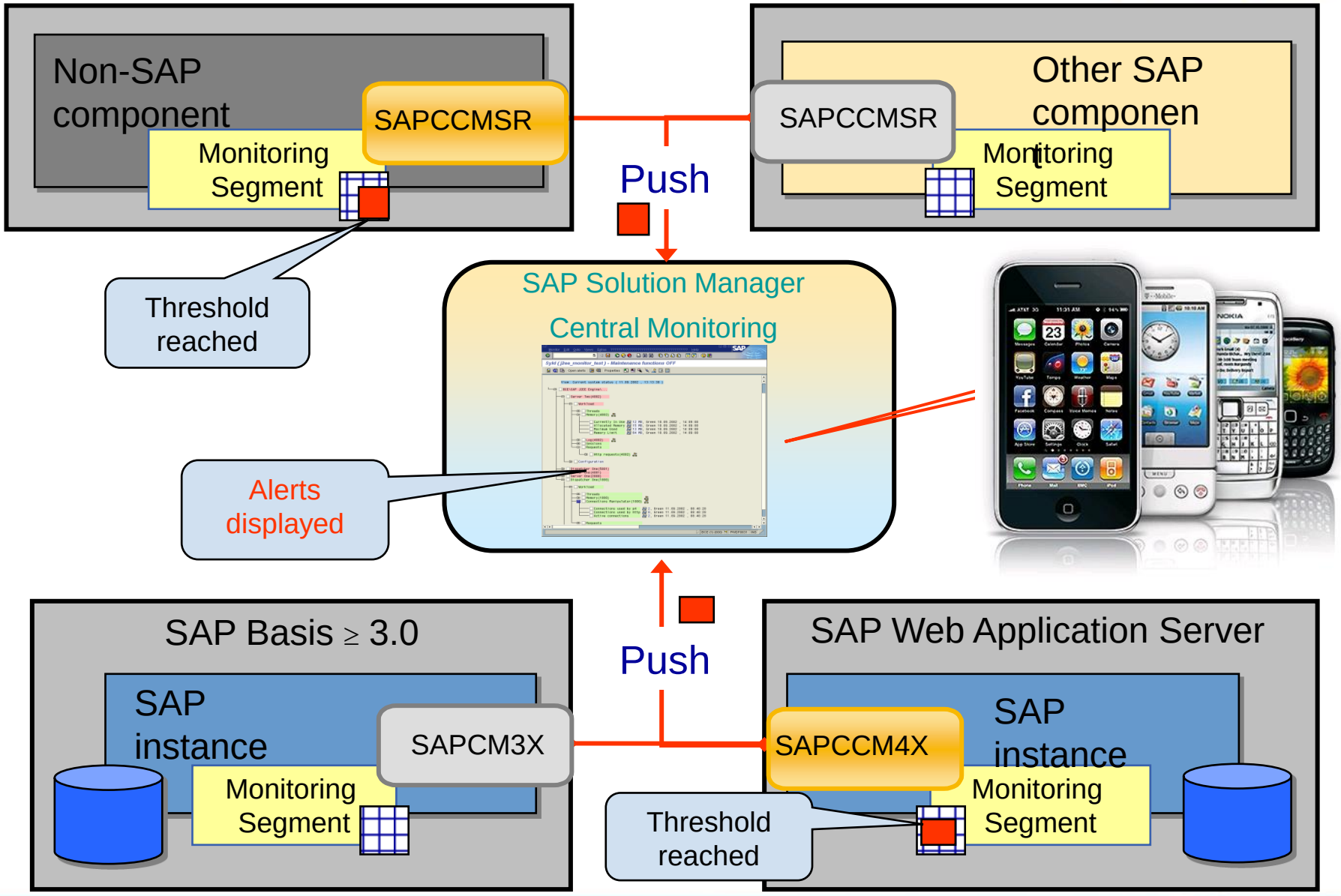
- Service Level Report
- Early Watch Allert
- System Administration Page

Reactive Monitoring

Reactive Monitoring tries to notify the administrators in critical situations as soon as possible -> Via automatic notification mechanisms. How can Solution Manager Help you ?:

- Agent push tecnology: notification in case of alert

Reactive monitoring, a real case:



Company overview

PROFILE

CST Consulting is an IT consulting, technology services and outsourcing company

MARKET-PLACE

Europe, Middle East and Africa

VALUES

- Customer & People Focus
- Ethics
- Quality & Loyalty
- Innovation & Value Creation

CORPORATE PROFILE (2010-2011)

- Team: 115 (+25%)
- Customers & end users: 83 (+20%)

SAP FOR ENTERPRISE

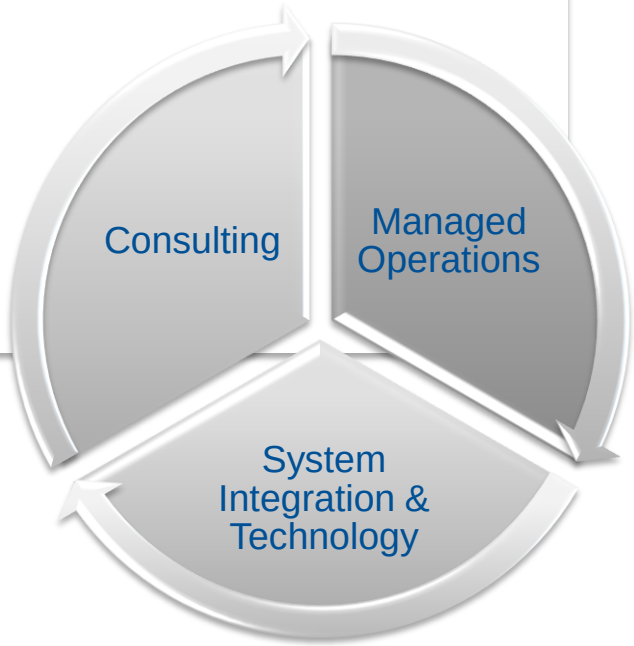
ENTERPRISE CONTENT MANAGEMENT

CERTIFICATION SERVICES

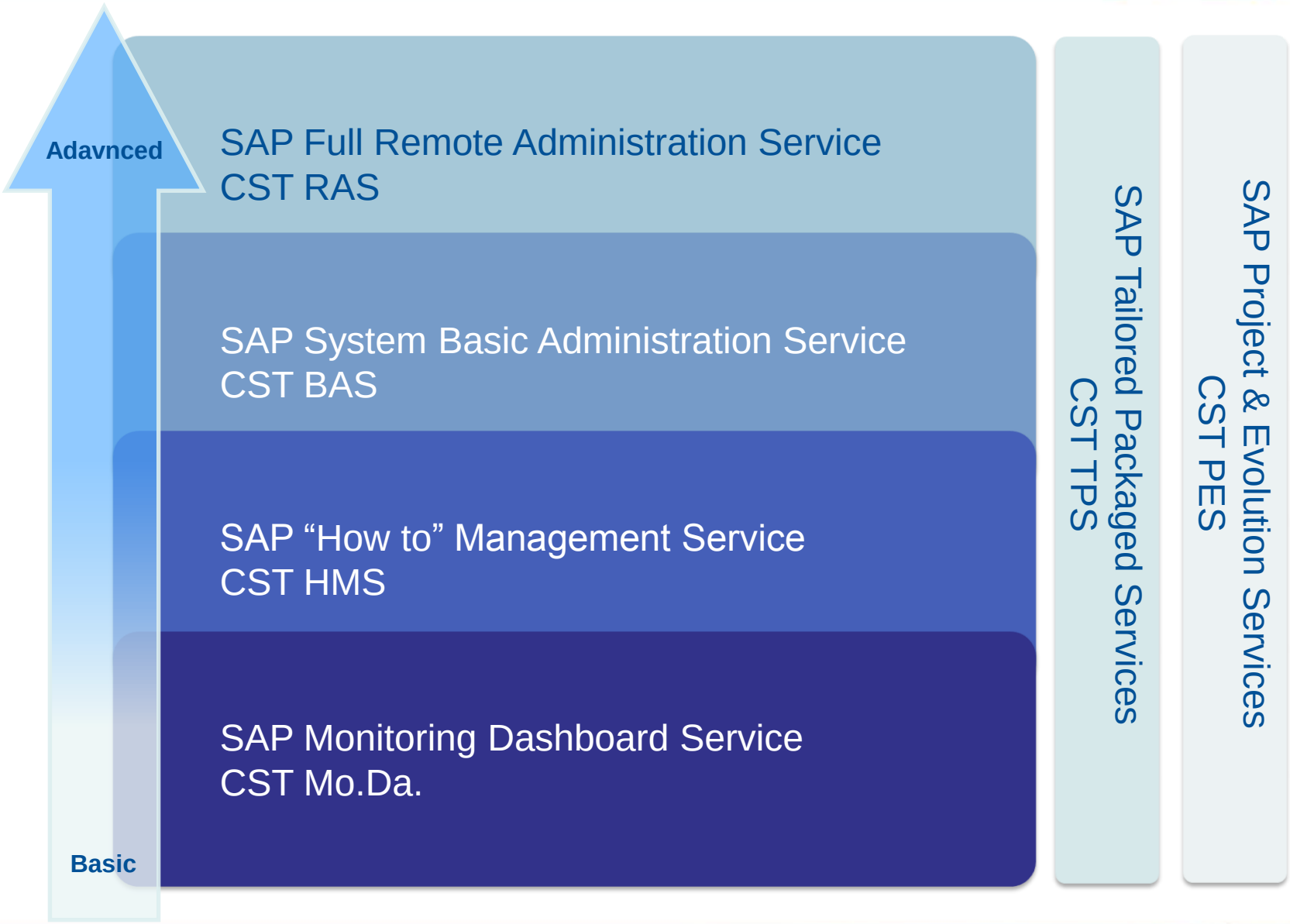
DOCUMENT OUTSOURCING

Core business, Technologies

- SAP Business Suite (ERP, PLM, SCM e CRM)
- SAP Netweaver Platform (PI, Enterprise Portal, MDM, BI, Mobile, Administration)
- SAP Application Management Service, SAP Competence Center & Abap Factory
- Specialization on SAP RE, SAP WF & SAP HCM
- Content Management & Business Process Management
- Legal archiving & e-invoicing
- Capture services, BPO & outsourcing (CST Servizi)



CST SAP-Basis Services

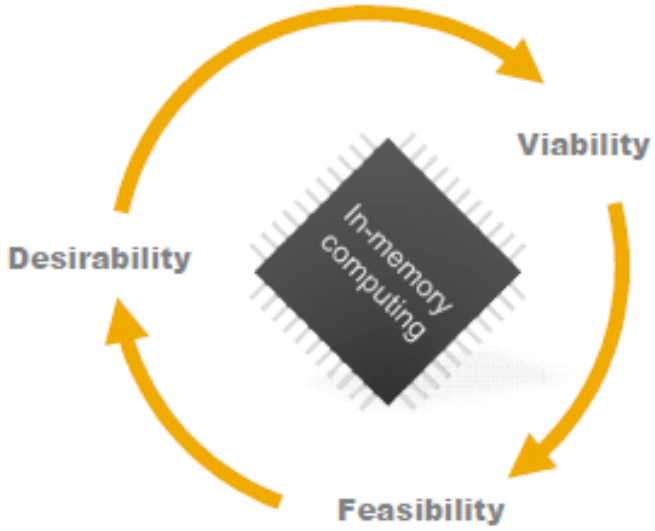


In-Memory Computing

The Next Wave of Technological Innovation

Exponential potential for change

- Ground-breaking **innovation**
  - Improvement in speed of access from disc to memory by 10,000 times
- Movement to main memory from disk storage: **viable performance** with increasing data volumes
  - Affordable servers: over 1 TB system memory
  - CPUs: multicore for rapid parallel processing
  - Structured and unstructured data more easily shared between systems,
- **Cost-feasible** technology: mass adoption
  - Business user access to rapid data processing



→ **In-memory computing: speed, volume, flexibility, and reach**

Latest trends

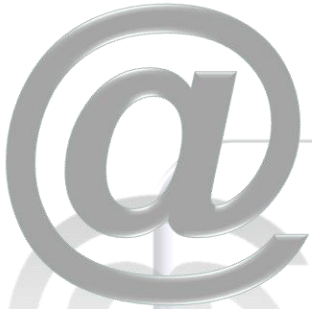
Activity Management

Account & Contact Management

Lead & Opportunity Management

Analytics & Reporting

Contatti



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