

Middleware Overview

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What are the business drivers?



Basis Communication Technology



Application Link Enabling



Component Integration



Internet Middleware



Distributed Environments



Future

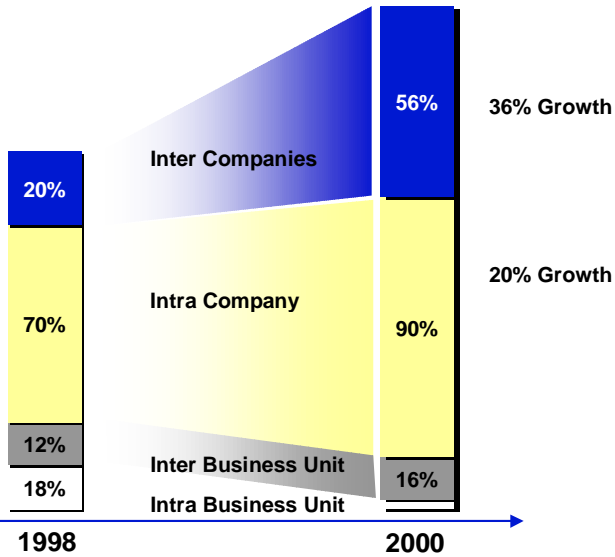


The Demand for Business Process Integration Across Heterogeneous Component Landscapes is Growing...



Trend: Linking of Business Processes INTER and INTRA Companies

*“Where in your organization are you deploying middleware?”
(multiple answers possible)*



Source: Forrester Research, Inc.
Report June 1997

Drivers for Distributed Components

● Business Reasons

- Local management of business
- One face to the customer
- Virtual organizations, joint ventures
- Decentralized responsibility
- Communication costs
- Reduced costs of upgrades



Drivers for Distributed Components

● Technical Reasons

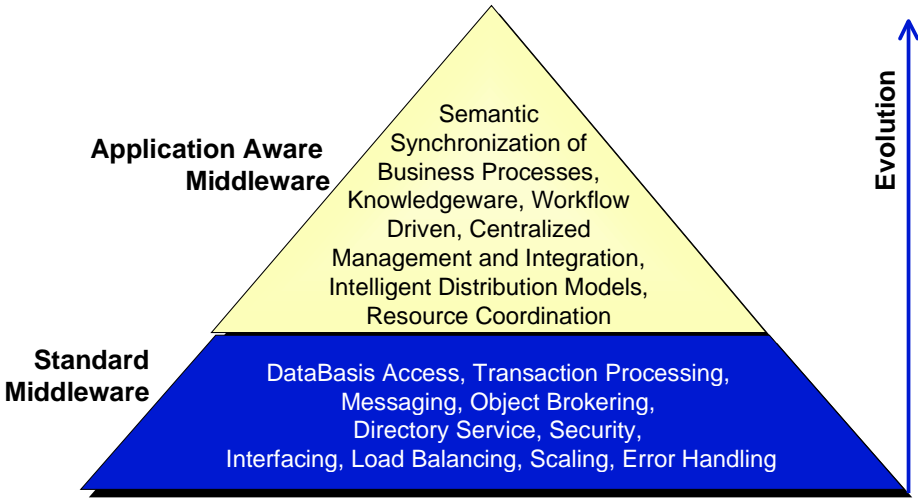
- Applications running on heterogeneous platforms
- Security of data access
- System availability
- Fail-Safety
- Performance

● New Business Opportunities

- Internet
- Self-service applications
- Mobile computing



Evolution of Middleware



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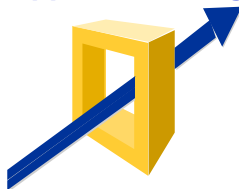
Basis Communication Technology

- Allows access to the core system and communication with ABAP programs/objects
- Logical point of contact shall be always BAPIs/BOs
- Different flavours of synchronous communication (RFC)
- Asynchronous communication via Idocs
- Future: XML based communication

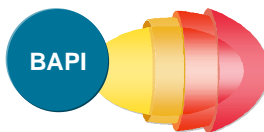


Basis Communication Technology

- **BAPI = Business Application Programming Interface**



- A BAPI is a well-defined **interface** to Processes and Data of a **business** application systems



Basis Communication Technology

- RFC - remote function call
Underlying communication technology of every access to R/3
- tRFC - guaranteed delivery, calls are buffered in queues
- qRFC - guaranteed and serialized delivery
- RMI - remote method call
- Idoc
 - Packages of structured data
 - EDI compliant
- Future: HTTP, XML

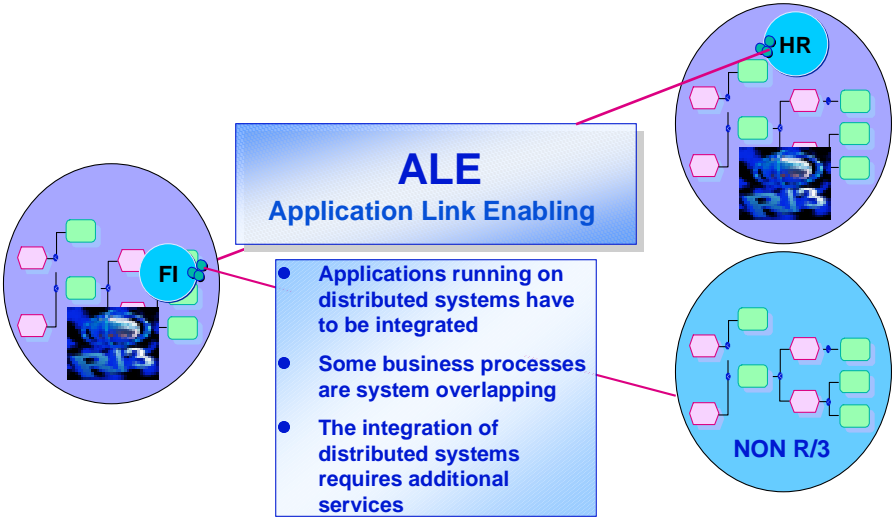


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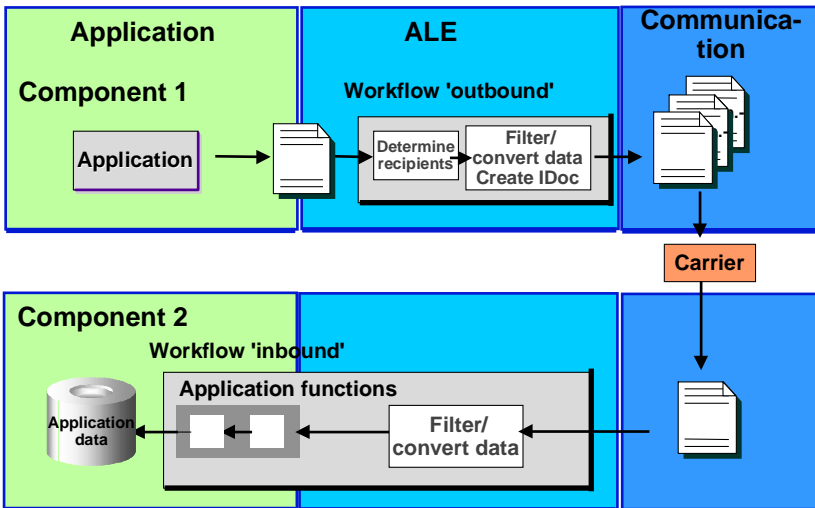
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ALE – Business Process Middleware



ALE – Information Flow



ALE Services

● ALE management services

- Distribution model
- Workflow-based, automated, exception handling
- User management
- Monitoring, Auditing
- Consistency checks
- Compare tool for recovery

→ Central control of components

● ALE synchronization services

- Semantic mapping of business process activities into components
- Business object synchronization across components
- Semantic translation of data representations (RDBMS, *liveCache*, ODBMS)
- Release independence

→ Component-spanning business processes

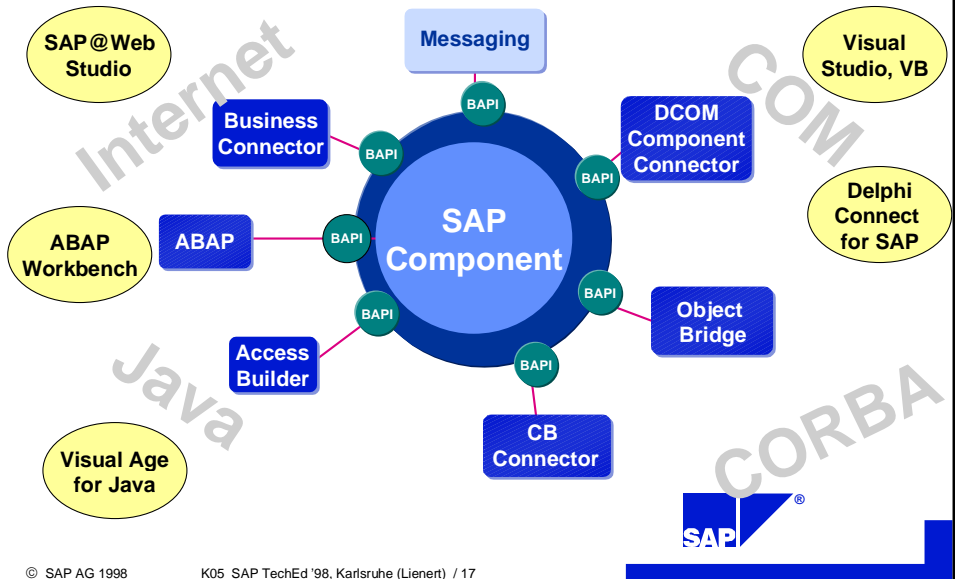


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Component Integration Technology



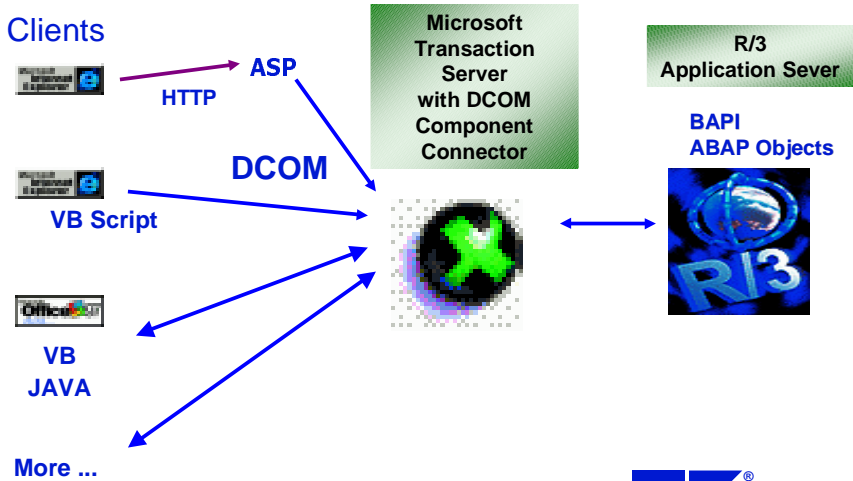
Component Integration Technology: COM

● DCOM Component Connector

- exposes transparently SAP Business Objects to COM, and COM objects to ABAP
 - ◆ integrates with Microsoft Transaction Server
- areas of use:
 - ◆ stand-alone clients (no installation on clients, high scalability through connection pooling)
 - ◆ C2C* (manageability, high scalability through connection pooling)
- developed by SAP, available 3Q98
 - ◆ next version will support 2-phase-commits and outbound calls, requires MTS 3.0

* Component-to-Component SAP

DCOM Component Connector



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Component Integration Technology: CORBA

● Object Bridge

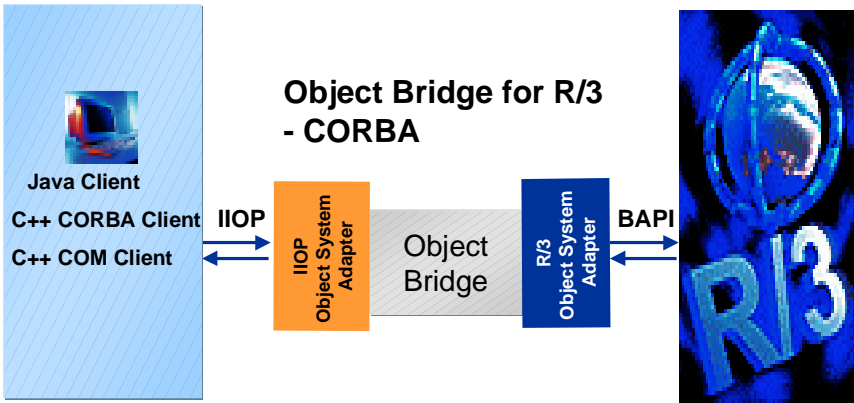
- provides bi-directional interoperability between R/3 and the CORBA object model
- areas of use:
 - ◆ C2C ("many-to-many" system, with interoperability between ORBs and DCOM)
- developed by Visual Edge, available since 2Q98

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Object Bridge for R/3 – Architecture

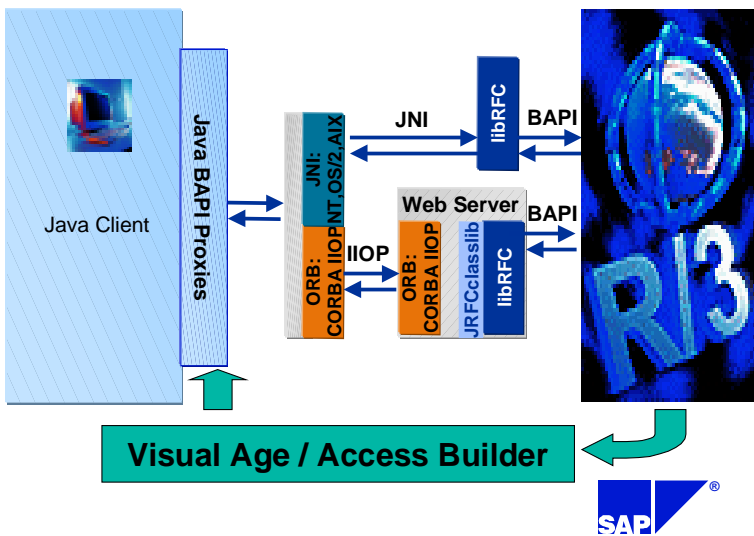


Component Integration Technology: Java

- **B APIs are available as Java proxy classes**
- **Mapping defined and developed by IBM and SAP**
- **Java proxy classes communicates to R/3**
 - via Java Native Interface (JNI) to JRFC library
 - via Orbix (IONA)
- **Availability as stand-alone classes**
- **Available in the context of Visual Age (IBM) since 2Q98 (V1.0)**
 - V1.1 is part of Visual Age for Java Enterprise Edition 2.0, available 3Q98



Access Builder for SAP R/3 – Architecture



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Component Integration Technology – EJB

- Enterprise Java Beans are the next step
- IBM offers an enhanced infra structure based on their component broker



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Internet Middleware

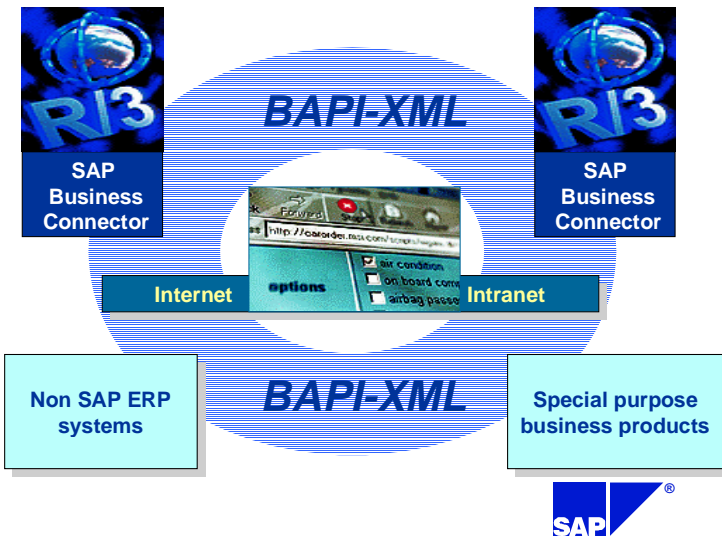
● Business Connector

- Internet, intranet, and extranet connectivity
 - ◆ now extended to support distributed business processes over the Internet
- Areas of use:
 - ◆ browsers (enables Internet Application Components)
 - ◆ C2C (enables e-commerce, e.g. Business-to-Business Procurement)
- Developed by SAP
 - ◆ browser functionality (ITS) available since 4Q96, compatible with R/3 Release 3.1 and higher
 - ◆ C2C functionality available 1Q99, compatible with R/3 Release 3.1 and higher



SAP Business Connector

XML-based Communication via the Internet



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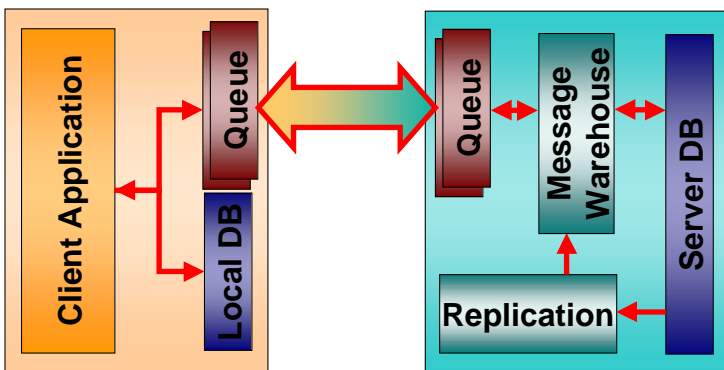
Distributed Environments

- **Middleware requirements beyond traditional client/server for partially disconnected systems**
 - Possibility to process business logic offline
 - Consolidation of distributed data input sources
 - Acknowledgement control
 - Replication of central data
 - Transactional data transport
 - “Easy” administration and configuration
- **Wireless communication**

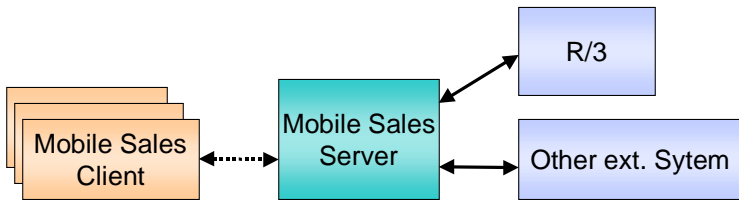


Distributed Environments

- **Architecture for offline business logic**



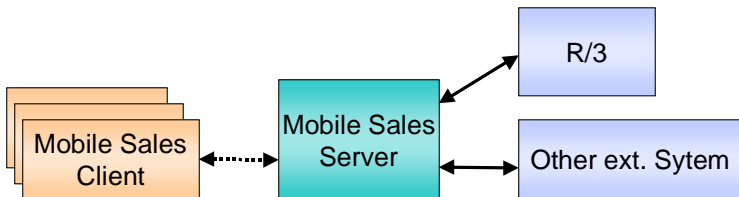
Mobile Sales Middleware



- **Communication partner for Mobile Sales Clients**
- **Consolidation of client data**
- **Replication of data to clients**
- **Access to existing R/3 or other external system**
- **Additional services can be added**



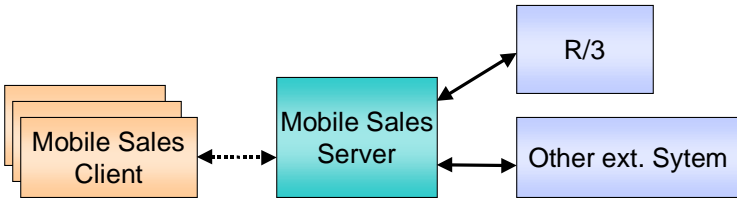
Mobile Sales Middleware



- **Sales reps log on to Mobile Sales Server to send/ receive updated information on a regular basis, e.g. once a day**
- **Sales reps generate offline business data, e.g. new customers, orders, etc.**
- **During next logon data is transmitted to SFA Server for processing and new data is retrieved**



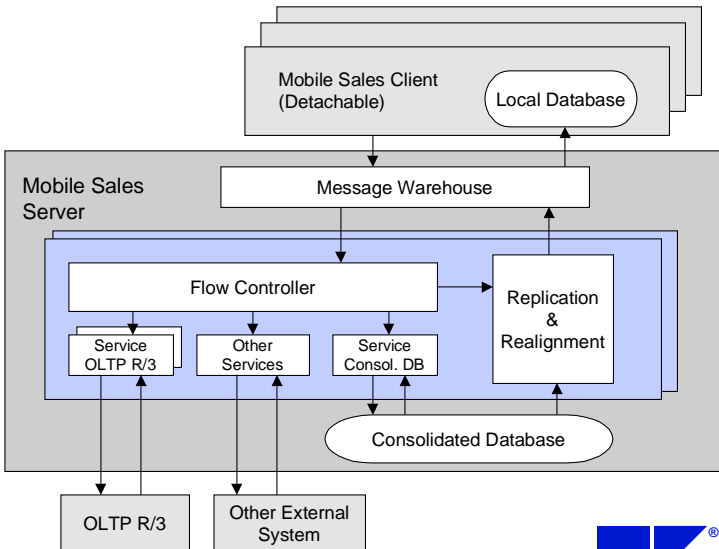
Mobile Sales Middleware



- **Mobile Sales Server consolidates data of all sales reps in one database, accesses online R/3 or other external systems as necessary**
- **Mobiles Sales Server prepares data to be distributed to sales reps during next logon, e.g. quotations, approved orders, etc.**



Mobile Sales – Message Flow



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Future

- **Size of clients diverging**
 - **“Tier 0” clients**
 - ◆ handhelds with little memory and processing power
 - **very thin clients / browser-based**
 - ◆ away from ActiveX controls and Java applets
 - ◆ towards DHTML and XML/XSL
 - **not-really-that-fat clients**
 - ◆ few business logic in the front-end, but plausibility checks to improve speed of interaction



Future

- **Growing convergence of CORBA and Java**
 - ◆ Enterprise JavaBeans specs resemble CORBA specs (e.g., JTS & OTS)
 - ◆ RMI over IIOP
- **XML gaining popularity**
 - ◆ separation of content and presentation
 - ◆ standardized meta data tagging
 - ◆ successor of EDI?
- **Explosion of Inter-Company business process level integration**



Thank You !

