




Systeme, Anwendungen und Produkte (SAP)

Grundlagen von Unternehmensanwendungen

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Enterprise Platform and Integration Concepts

Hasso-Plattner-Institut



Businesses are **complex.**
Running them shouldn't be.



In 1972, a group of colleagues
got together with an **idea.**




That idea became the world's most powerful business software.

77% of the world's
transaction revenue
touches an **SAP** system.

SAP

An aerial night view of Taipei, Taiwan, featuring the Taipei 101 skyscraper prominently on the right side, illuminated with green and red lights. The city lights create a dense, glowing pattern across the landscape under a dark, cloudy sky.



SAP customers distribute
more than **78%** of the
world's food.

SAP customers produce more than **82%** of the coffee and tea we drink each day.



437,000+

Customers

100,000+

Employees

18,000+

Partners

25

Industries

€24.8B

Revenue
in 2018

92%

of the Forbes
Global 2000
are SAP
Customers

#28

of Fortune's 2019
top 100 places to
work

180+

Countries

Best-run Businesses Are
Intelligent Enterprises
Are Integrated Enterprises

The Intelligent Enterprise

A hand holding a pen pointing at a digital screen displaying data. The screen shows various data points and charts, with a prominent green bar chart. The background is dark with blue and green light effects.


Sales and Distribution

Material Management

Finance


Human Resources

Enterprise Resource
Planning




Customer Relationship
Management

The Intelligent Enterprise



Enterprise Resource
Planning




Customer Relationship
Management


The Intelligent Enterprise



Human
Resources



Enterprise Resource
Planning




Customer Relationship
Management

The Intelligent Enterprise



Human
Resources



Enterprise Resource
Planning



Workforce Management



General Procurement



Customer Relationship Management

The Intelligent Enterprise



Human Resources



Enterprise Resource Planning



Workforce Management



General Procurement



Customer Relationship Management



Travel & Expenses

The Intelligent Enterprise



Human Resources



Enterprise Resource Planning



Workforce Management



General Procurement

SAP Ariba



Customer Relationship Management

SAP C/4HANA (CRM)



Travel & Expenses

SAP Concur

The Intelligent Enterprise



SAP SuccessFactors (SFSF)

Human Resources



SAP S/4HANA (ERP)

Enterprise Resource Planning

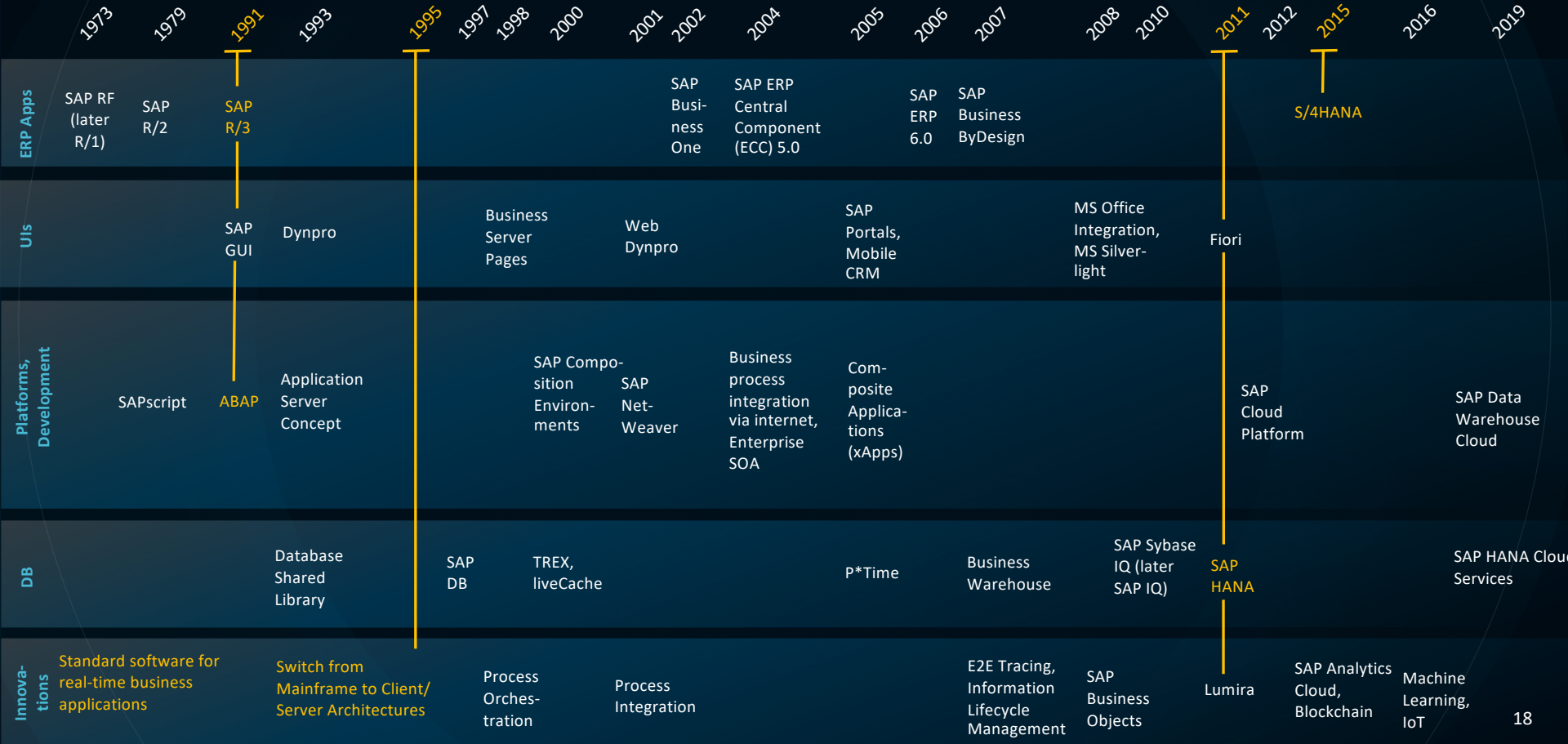


SAP Fieldglass

Workforce Management

Aerospace and Defense	Automotive	Banking	Chemicals
Consumer Products	Defense and Security	Engineering, Construction, and Operations	Financial Service Providers
Healthcare	High-tech	Higher Education and Research	Hospitality Services
Industrial Machinery and Components	Insurance	Life Sciences	Logistics Service Providers
Media	Mill Products	Mining	Oil and Gas
Pharmaceuticals	Postal Services	Professional Services	Public Sector
Railway Services	Retail	Telecommunications	Utilities

SAP Creates Technology Since More Than 45 Years



Sometimes it's the strongest among us that need the most help.

ELEPHANTS, RHINOS & PEOPLE IS A BEST-RUN BUSINESS. The nonprofit Elephants, Rhinos & People (ERP) trusts SAP HANA® to help integrate drone footage and GPS data into their efforts to keep endangered elephants and rhinos safe from poachers. Thereby helping to preserve the world's ecosystem for future generations.

THE BEST-RUN BUSINESSES MAKE THE WORLD RUN BETTER.

For more, go to sap.com/conservation



THE BEST RUN

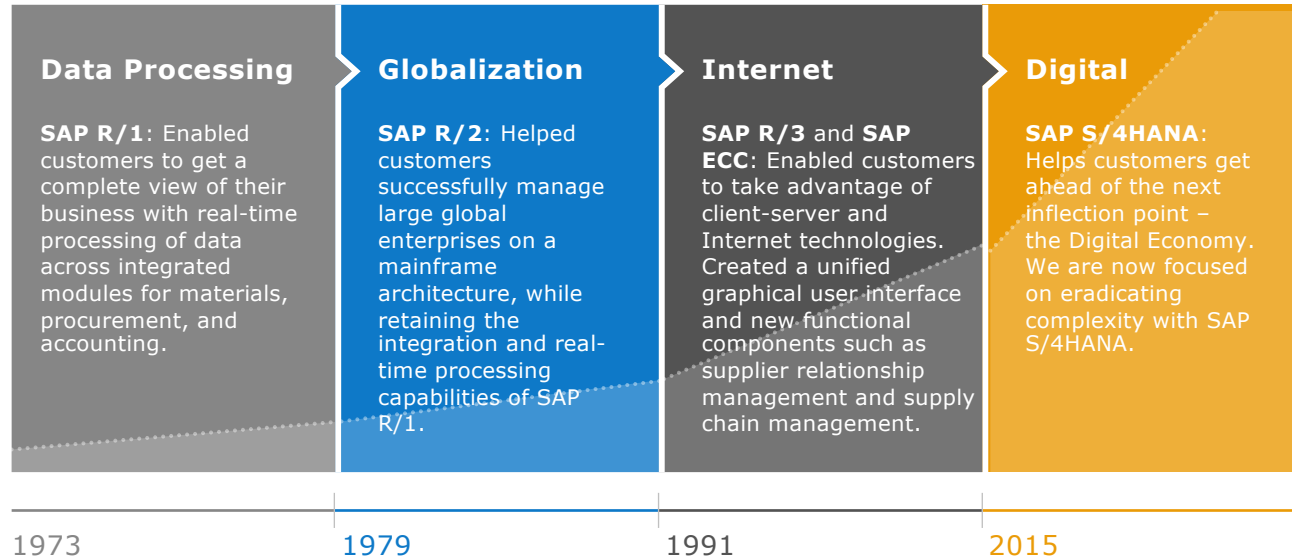


But What Is an ERP?

Enterprise Resource Planning (ERP)

- is a **computer-based system to manage** internal and external **resources**, including tangible assets, financial resources, materials and human resources
- it's purpose is to **facilitate** the flow of **information between all business functions** inside the boundaries of the organization and manage the connections to outside stakeholders
- enables companies to **manage** their **entire value chain** and the **most critical business processes**

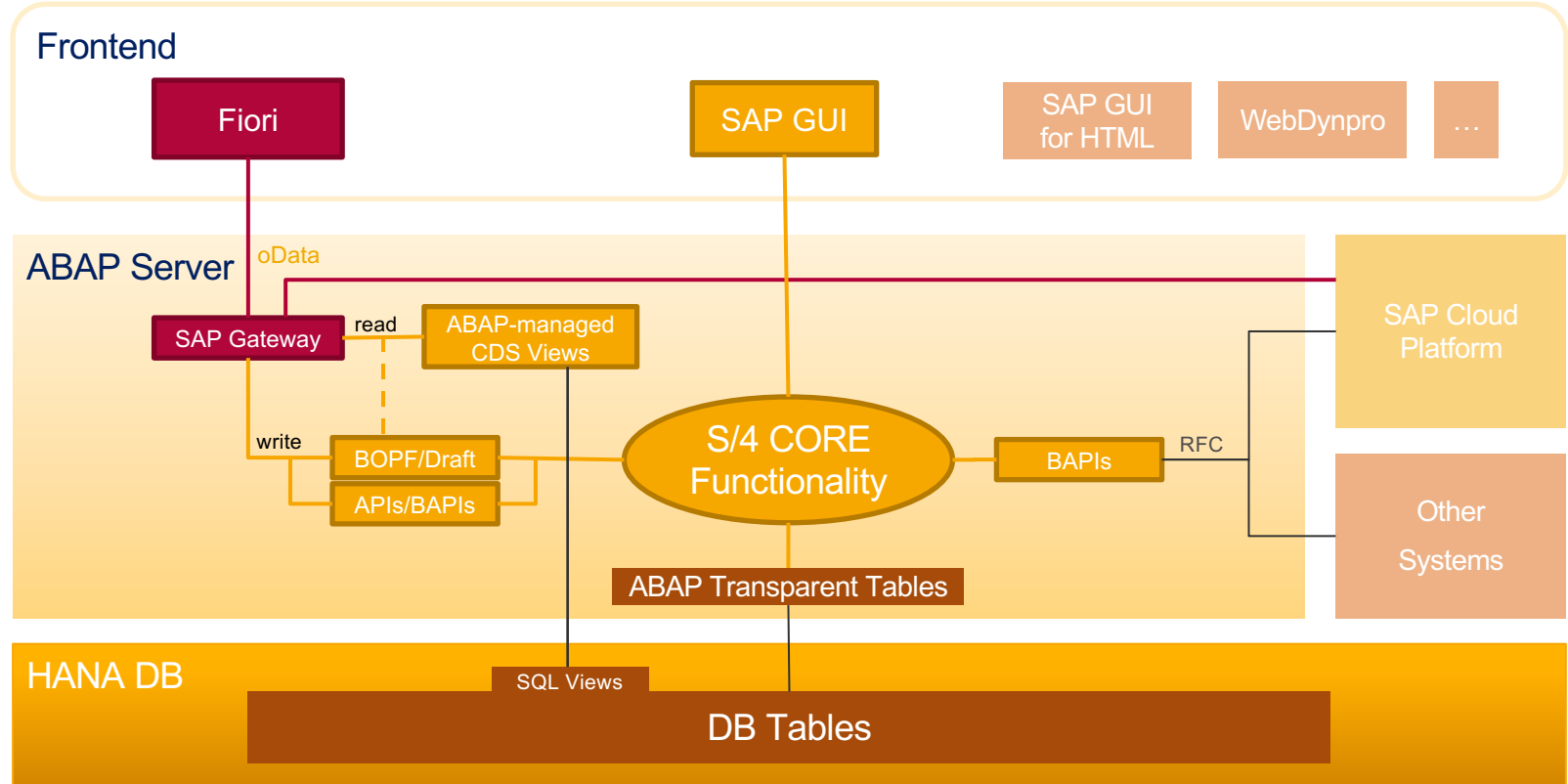
Evolution of Enterprise Resource Planning



SAP S/4HANA Architecture

The System at a Glance

BAPI Business Application Programming Interface
BOPF Business Object Processing Framework
CDS Core Data Services
RFC Remote Function Call
(Web)Dynpro Dynamic Program (for Web)



The Fiori Launchpad

The Furious Youth



use the search to find apps or business objects containing a certain term

login users are associated with certain business roles

tiles represent applications (and key figures) and are grouped by area

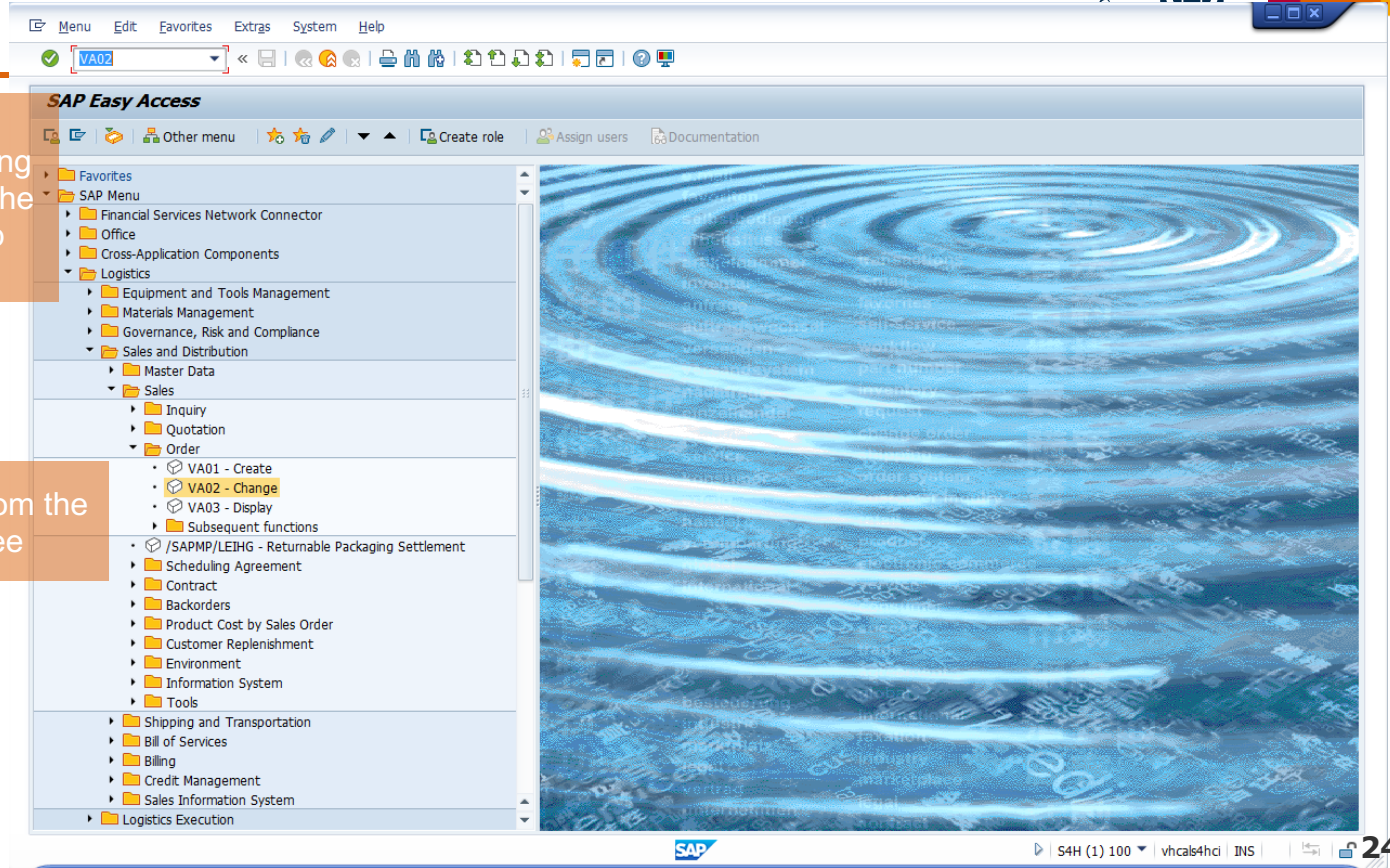
The screenshot shows the SAP Fiori Launchpad interface. At the top left, a user profile for 'Marilyn Material' is visible with a 'Sign Out' button. The main navigation bar includes 'Home', 'Inventory Management Overview', 'Warehouse Management', and 'Warehouse Processing'. A search icon is circled in orange in the top right corner. Below the navigation bar, there are several tiles. In the 'Warehouse Management' section, the 'Manage Stock' tile is circled in orange. In the 'Warehouse Processing' section, there are tiles for 'Material Documents Overview', 'Post Goods Receipt for Purchase Order', 'Transfer Stock In-Plant', and 'Post Goods Movement'. On the right side, a search results window is open, showing a list of results for 'Standard Order 1'. The first result is circled in orange. Below this, a detailed factsheet for 'Standard Order 1' is displayed, with the 'Items' tab selected. The 'Items' table has one row: 'Trad Good 10.PD.Third Party (TG10)'. This row is circled in orange. A text box on the right side of the factsheet says 'click on search results to display factsheet of the business object'. Another text box at the bottom right of the factsheet says 'navigate on to related business object factsheets'. The SAP logo and 'US Customer 1' are visible in the top right of the factsheet window.

SAP GUI (1/2)

The Old Wisdom

open applications using transaction codes in the input field at the top

or choose them from the SAP menu tree



SAP GUI (2/2)

The Old Wisdom

at the selection screen press F8 or use the icon to proceed

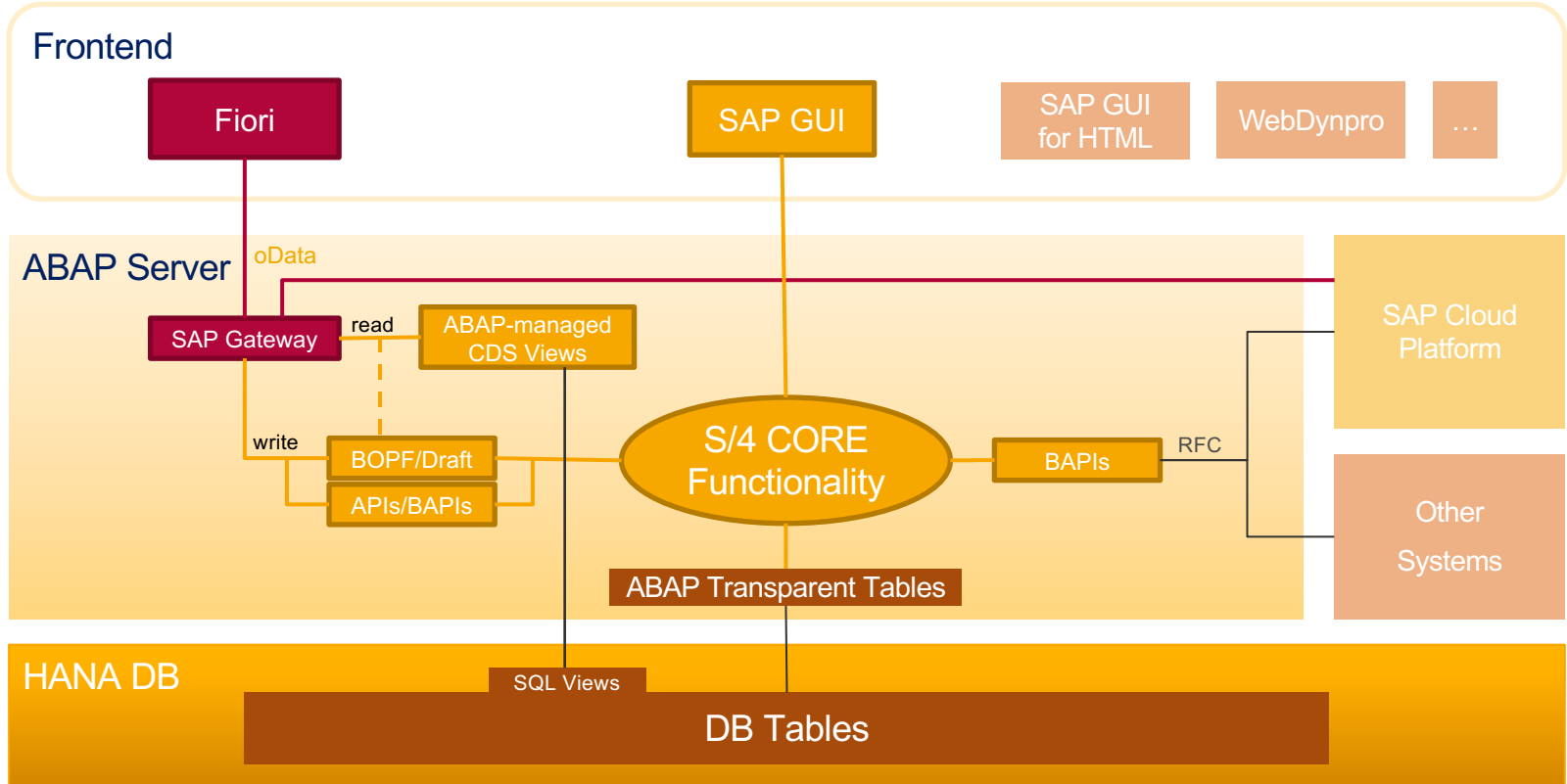
Nearly everything is forward navigation enabled, use double click

transaction code can be displayed at all times here

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Business Objects Are Manifestations of Processes...

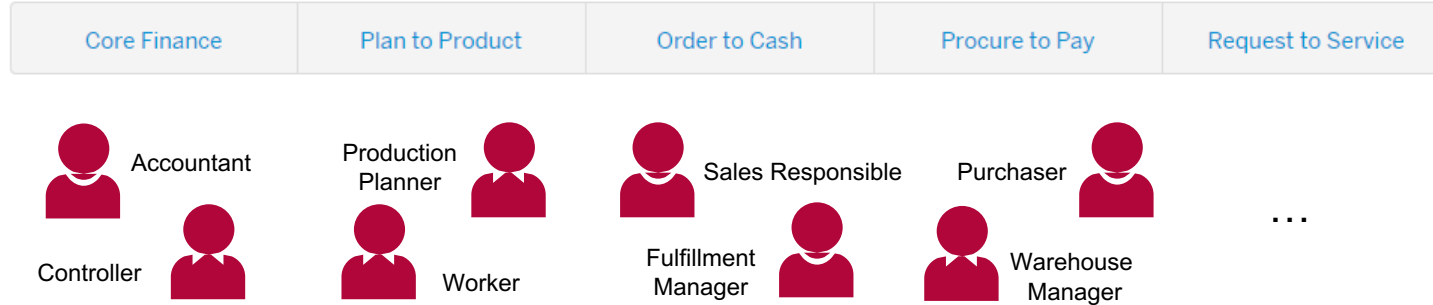
Core Finance	Plan to Product	Order to Cash	Procure to Pay	Request to Service
Accounting & Financial Close Journal Entries	Production Planning Planned Order	Order & Contract Management Sales Order Outbound Delivery	Sourcing & Contract Management	Service Management
Financial Planning & Analysis	Manufacturing Execution Production Order	Inventory & Warehouse Management Goods Issue	Operational Procurement Purchase Requisition Purchase Order	Service Parts Management
Treasury & Financial Risk Management	Inventory & Warehouse Management Goods Movement	Order & Contract Management Customer Invoice	Inventory & Warehouse Management Goods Receipt	Service Project Management Sales Order
Collaborative Finance Operations Payments	Product & Project Management	Accounts Receivable Accounts Receivables	Invoice & Payables Management Incoming Invoice Accounts Payable	
Enterprise Risk & Compliance Management	Maintenance & Quality Management			

..Then There Is This Thing Called Master Data..

Core Finance	Plan to Product	Order to Cash	Procure to Pay	Request to Service
Accounting & Financial Control Company Code G/L Accounts	Production Planning Material Bill of Material	Order & Contract Management Customer	Sourcing & Contract Management Supplier	Service Management
Financial Planning & Accounting Cost Center Profit Center	Manufacturing Execution Work Center Resource	Inventory & Warehouse Management	Operational Procurement	Service Parts Management
Treasury & Financial Risk Management	Inventory & Warehouse Management	Order & Contract Management	Inventory & Warehouse Management	Service Project Management
Collaborative Finance Operations	Product & Project Management	Accounts Receivable	Invoice & Payables Management	
Enterprise Risk & Compliance Management	Maintenance & Quality Management			

master data records are used between multiple areas and processes

.. All Ruled by Specific Personas



Advanced Business Application Programming

Allgemeiner Berichtsaufbereitungsprozessor



Proprietary programming language (close to COBOL) for **massive data processing**

- Backward compatible
- Many extensions, e.g., objects
- Since R/3, modules are written in ABAP
- NetWeaver Application Server to run programs (also available in Java)
- Open SQL allows integrated database access (OLTP and OLAP)
- Remote function calls
- Transport jobs to move code between dev -> test -> prod instances
- Next Generation ABAP (NGAP) cleans up and declines backward compatibility

```
REPORT ztest.

CLASS demo DEFINITION.
  PUBLIC SECTION.
    CLASS-METHODS main.
ENDCLASS.

CLASS demo IMPLEMENTATION.
  METHOD main.
    DATA tstc_tab TYPE STANDARD TABLE OF tstc WITH NON-UNIQUE DEFAULT KEY.
    DATA alv      TYPE REF TO cl_salv_table.
    DATA exc      TYPE REF TO cx_salv_msg.
    SELECT *
      FROM tstc
      INTO TABLE tstc_tab.
    TRY.
      cl_salv_table=>factory(
        IMPORTING r_salv_table = alv
        CHANGING t_table = tstc_tab ).
      alv->display( ).
    CATCH cx_salv_msg into exc.
      MESSAGE exc TYPE 'I'
        DISPLAY LIKE 'E'.
    ENTRY.
  ENDMETHOD.
ENDCLASS.

START-OF-SELECTION.
  demo=>main( ).
```

Core Data Services (CDS) Views

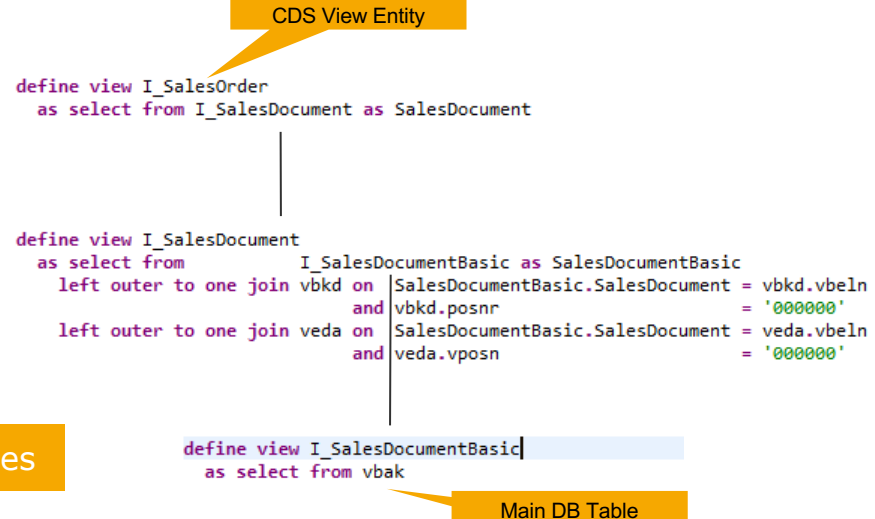
A Layer of Abstraction

Virtual Data Model (VDM) on top of DB tables using ABAP-managed CDS Views

Added business semantics

Composition of related DB tables included

Technical names converted into readable names

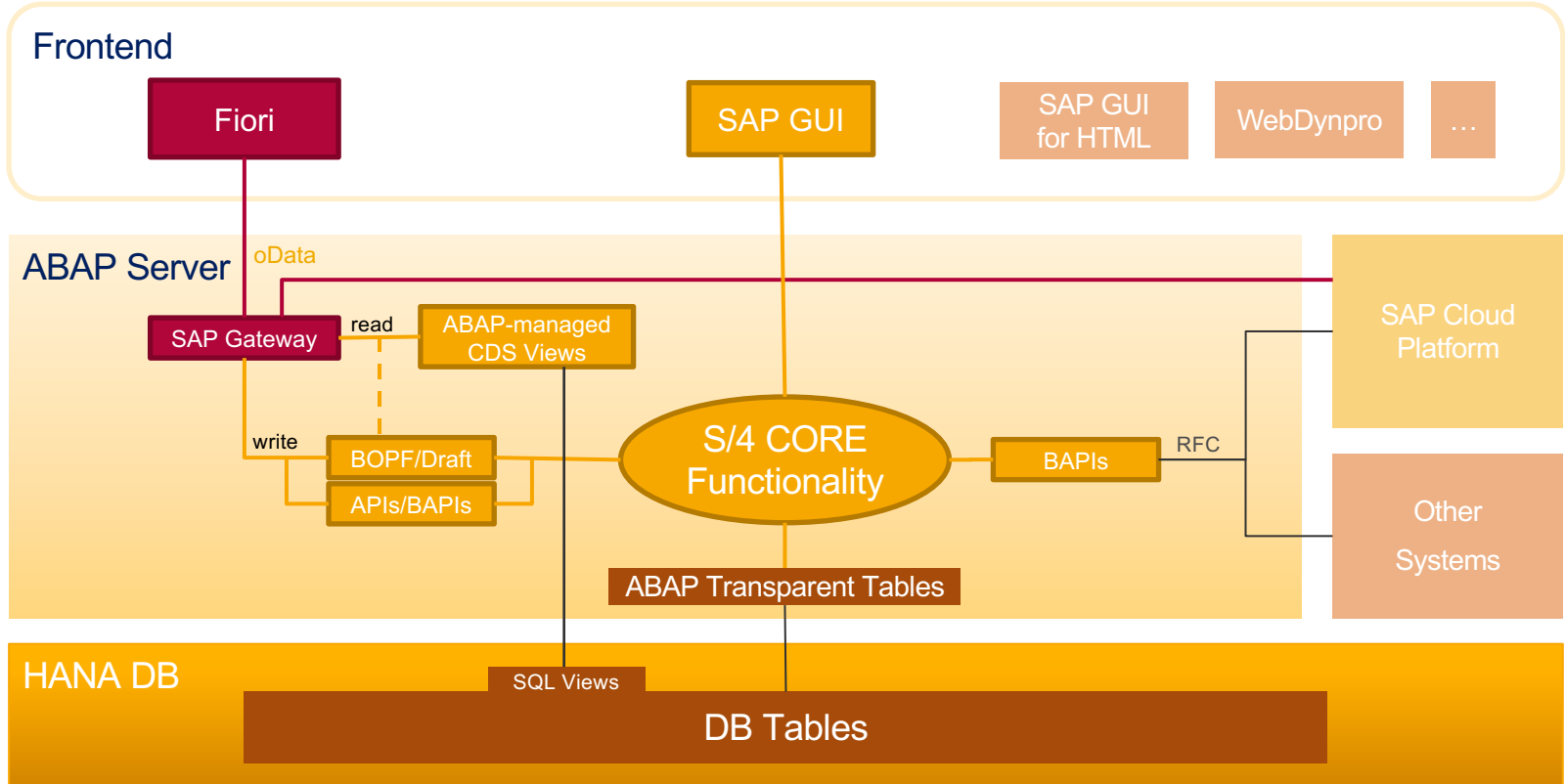


→ Facilitates access and comprehension with minor to zero knowledge required

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SAP HANA

The In-Memory Revolution



Large amount of main memory



Massively parallel processing



Columnar storage



Data compression



Partitioning and replication



Single- and multi-tenancy



On-the-fly extensibility



Structured and unstructured data



Advanced data protection



ML and Predictive Analytics Library



Data footprint reduction



Complex queries



High scan performance



No materialized aggregates



Persistent memory support



High availability Disaster recovery



Aggregate caching



Built-in text, graph and geospatial libraries

OLAP + OLTP

Analytical applications on transactional system



Variable time scaling



Simplified data model



Integrated application logic



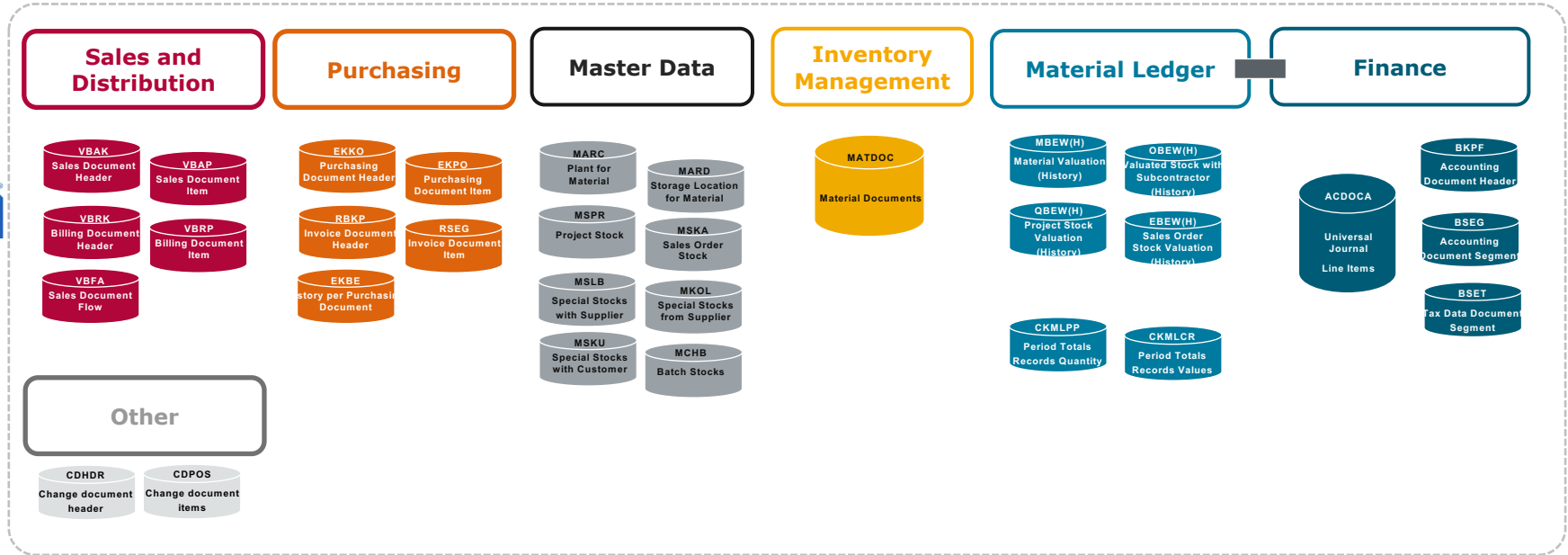
High workload capacity



Time travel

Prominent Tables

SAP HANA Database



A hand holding a pen pointing at a digital screen displaying data. The screen shows a line graph with green and blue lines, and some text like 'GF10G12' and '2.3M'. The background is dark with blue and green light effects.

The Intelligent Enterprise

**SAP S/4HANA
(ERP)**

Enterprise Resource
Planning



General Procurement

Ariba

Acquired 2012



Customer Relationship Management

Acquired since 2013



Travel & Expense

Concur

Acquired 2014

The Intelligent Enterprise Is Built On An Enterprise Cloud Platform



SAP SuccessFactors

(SAP)

Human Resources

Acquired 2011



SAP acquired more than 70 companies

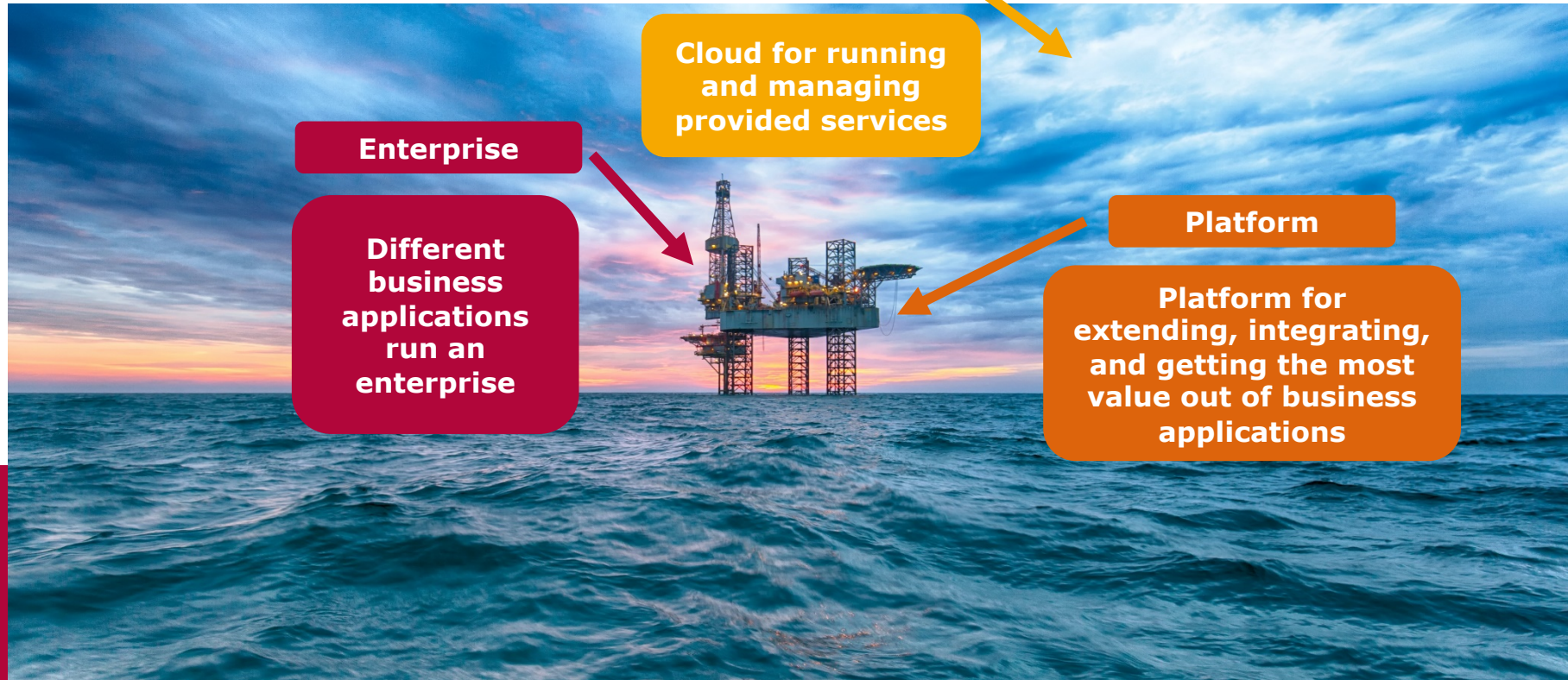
Enterprise Resource Planning



SAP Field Service

Work Management

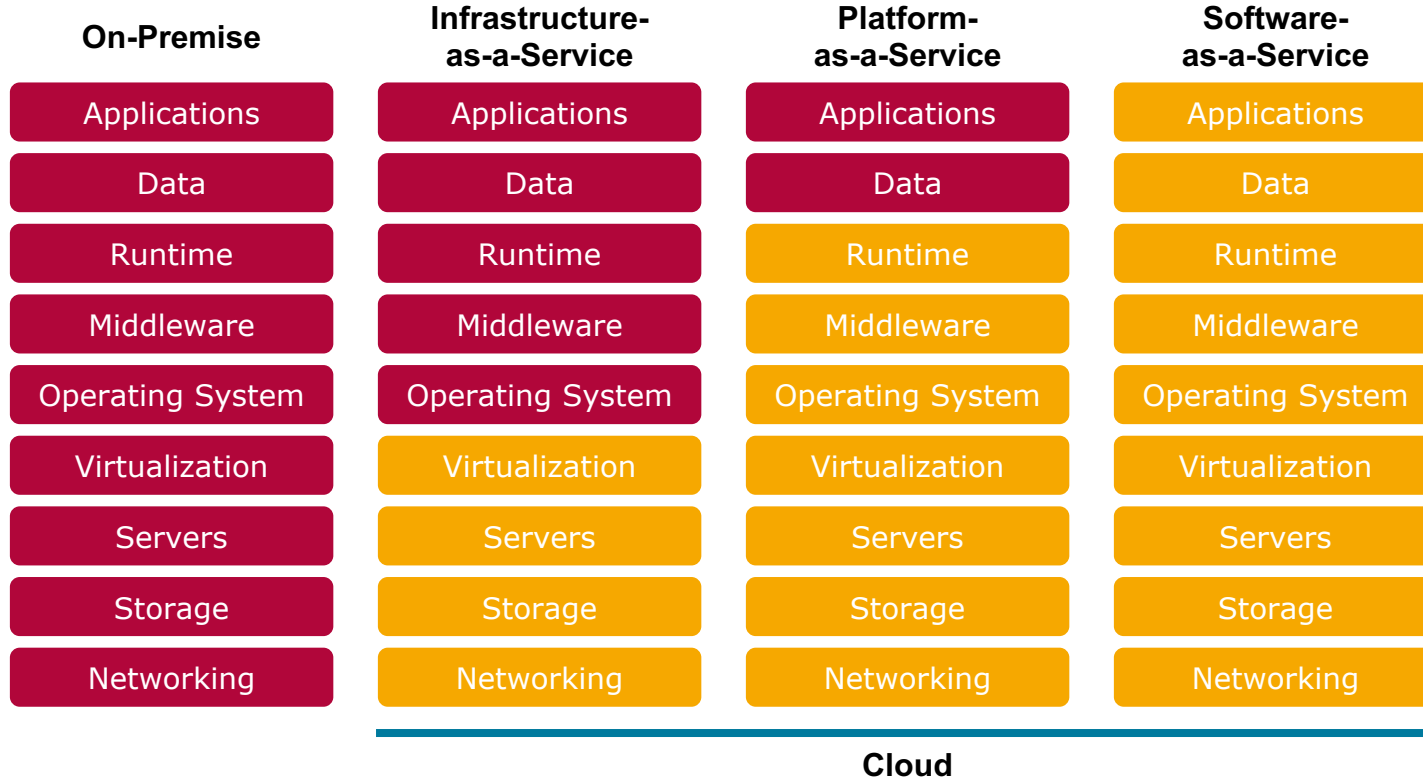
Acquired 2014



Enterprise Cloud Platforms

From On-Premise to the Cloud

- Extend
- Integrate
- Data-to-Value



- You manage
- Service provider manages

Vorlesungsinhalte

Grundlagen von Unternehmensanwendungen



- **Einführung zu Unternehmensanwendungen**
- Enterprise Resource Planning
 - Rechnungswesens, Controlling und Planung
 - Kundenauftragsabwicklung und Einkauf
 - Materialwirtschaft und Produktionsplanung
 - Personalwesen
- Kundenbeziehungsmanagement (Customer Relationship Management; Gast: Prof. Carsten Hahn)
- Datenbankkonzepte für Unternehmensanwendungen (inkl. spaltenorientierter Hauptspeicherdatenbanken)
- Enterprise Cloud Plattformen zur Erweiterung und Integration von Unternehmensanwendungen



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