

A photograph of a modern glass skyscraper with the Fujitsu logo on its facade. The building is partially obscured by green trees in the foreground. A red banner is overlaid on the bottom half of the image, containing white text.

# Mainframes in Tomorrow's Data Center

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Fujitsu BS2000/OSD Mainframe Summit  
Munich, 28th June 2012

Tomorrow's Data Center

Today's Data Center

Yesterday's Data Center

# The origins of IT



approx. 3000 BC

"Programming language"

**Cuneiform  
script**

Data medium:

- Clay tablet

Branch solutions:

- Administration  
- Inventory mgmt.

Users:

- Sumerians  
- Babylonians  
- Akkadians  
- Assyrians  
- Persians

# The origins of IT

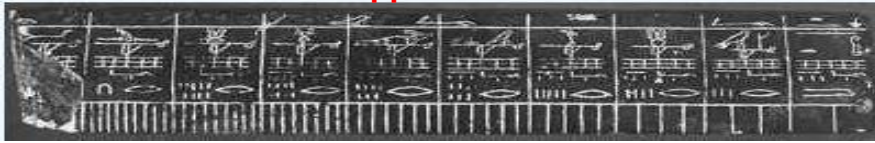
## 1. Programming language:

1 = 10 <sup>0</sup>	—	Ein Merkstrich oder Zeigefinger
10 = 10 <sup>1</sup>	⌋	Ein Bügel oder Huf
100 = 10 <sup>2</sup>	⌋⌋	eine aufgerollte Messschnur
1000 = 10 <sup>3</sup>	⌋⌋⌋	eine Lotusblume
10 000 = 10 <sup>4</sup>	⌋⌋⌋⌋	ein gekrümmter Zeigefinger
1 000 000 = 10 <sup>5</sup>	⌋⌋⌋⌋⌋	eine Kaulquappe
1 000 000 = 10 <sup>6</sup>	⌋⌋⌋⌋⌋⌋	der Gott der Unendlichkeit

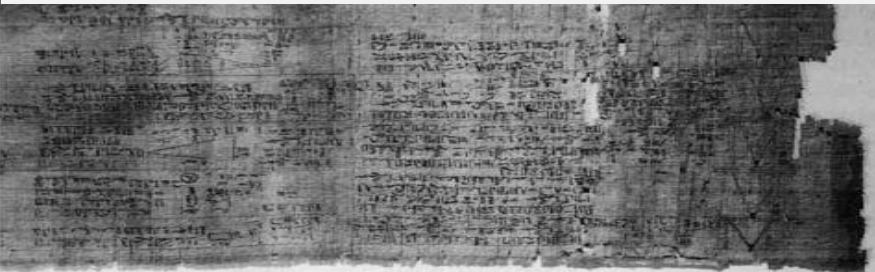
## Hieroglyphics

⌋	/	⌋⌋	⌋⌋	1/	12
⌋⌋	/	⌋⌋⌋⌋	⌋⌋⌋⌋	2/	24
⌋⌋⌋⌋	/	⌋⌋⌋⌋⌋⌋	⌋⌋⌋⌋⌋⌋	4/	48
⌋⌋⌋⌋⌋⌋	/	⌋⌋⌋⌋⌋⌋⌋⌋	⌋⌋⌋⌋⌋⌋⌋⌋	8/	96
⌋⌋⌋⌋⌋⌋⌋⌋	/	⌋⌋⌋⌋⌋⌋⌋⌋⌋⌋	⌋⌋⌋⌋⌋⌋⌋⌋⌋⌋	13	156

## 2. State-of-the-art IT support: Cubit rule



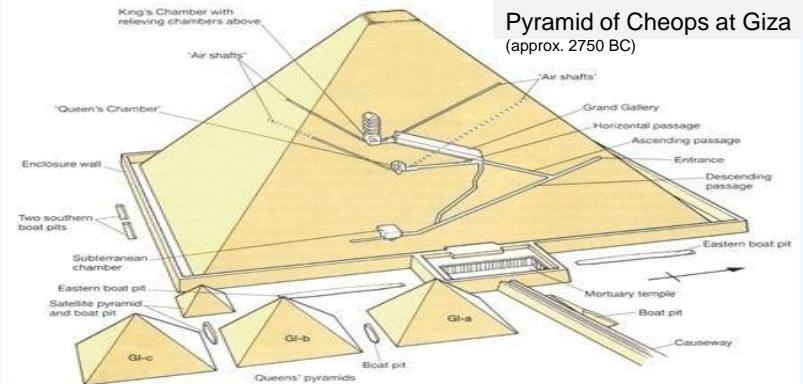
## 3. Data medium / Storage medium: Papyrus



## 4. Application: Branch application - Building of the pyramids (App)

(Individual application)

Pyramid of Cheops at Giza (approx. 2750 BC)





# Further development of IT

1100 BC

Suan Pan / ABACUS  
(Chinese version)



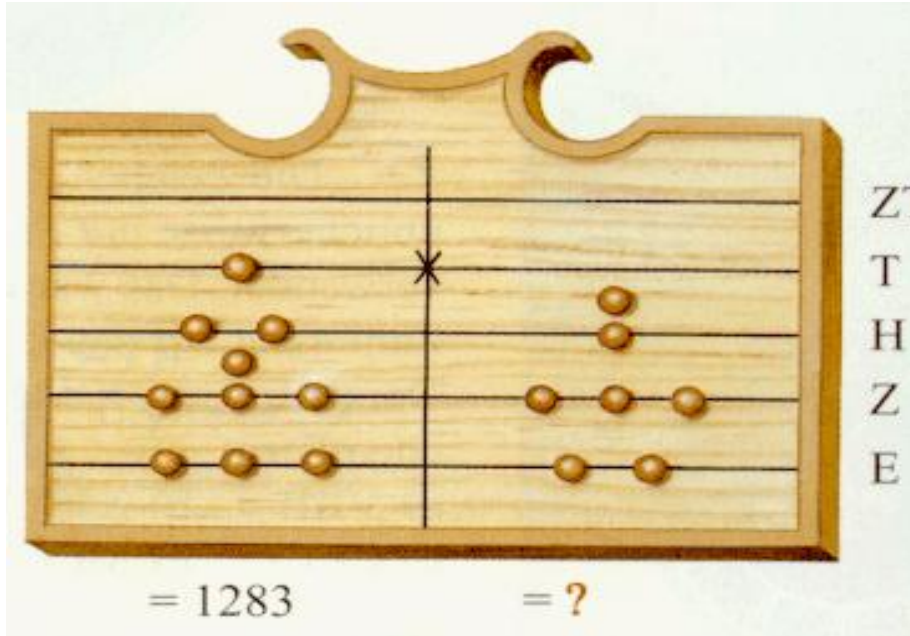
ABACUS  
(Roman version)



Medieval ABACUS data center

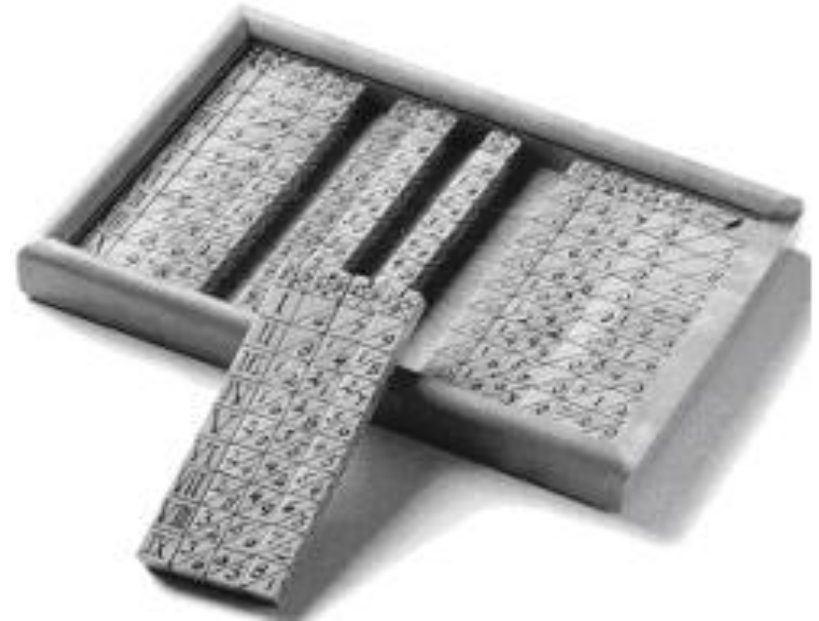


# Further development of IT



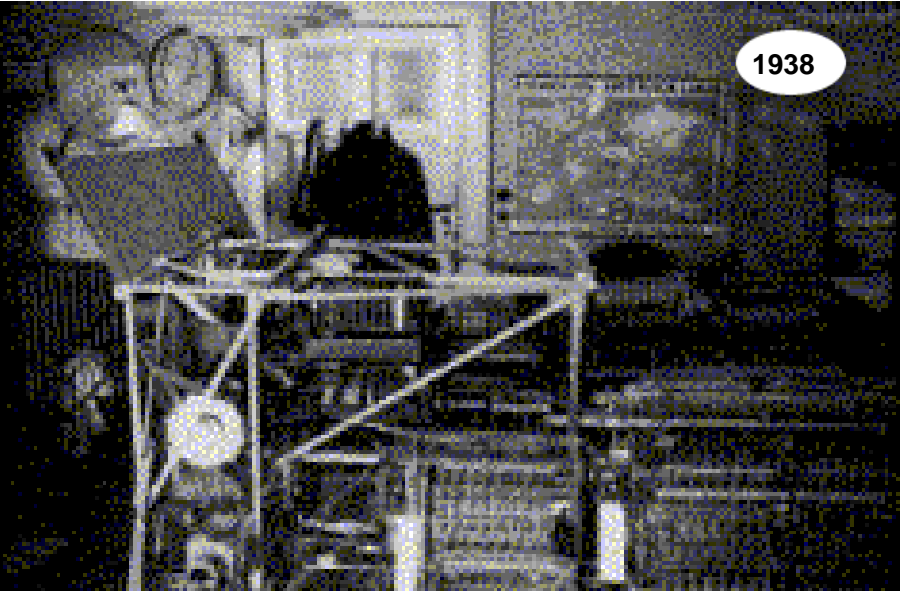
**Abacus**  
Adam Riese (Germany)

1500 AD

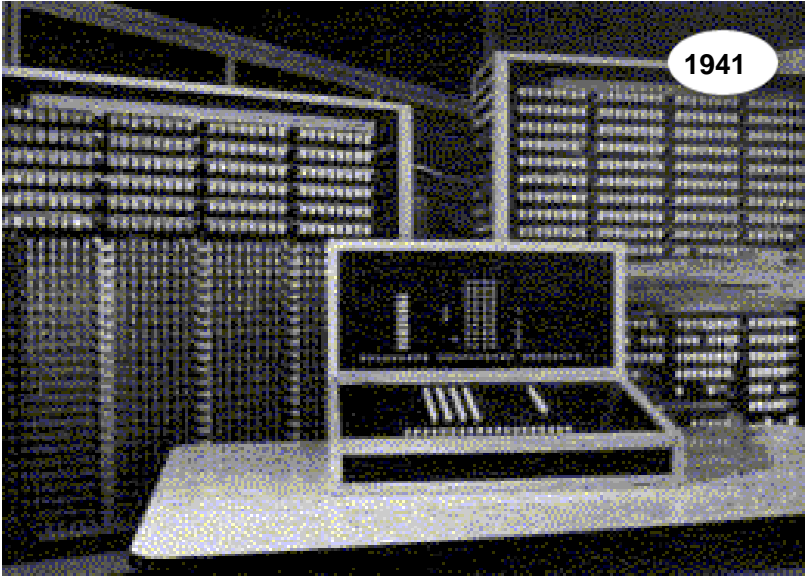


**Calculator**  
John Neper (Scotland)

# First Data Center



Z1



Z3

Konrad Zuse

# First Data Center



**ENIAC**

(Electronic Numerical Integrator and Computer)



# Data Center - Further developments



1978

FACOM M-200

# Data Center - Further developments



H120 Quadro



**K Computer**

\*) Floating Point Operations Per Second  
1 Peta =  $10^{15}$  (arithmetic operations per second)

# Data Center - Today's Installations

Anzahl Rechenzentren und installierter Server

	Anzahl Rechenzentren 2007	Anzahl installierter Server 2007	Durchschnittliche Anzahl von Servern pro Rechenzentrum
Deutschland	50.000	1.592.484 <sup>(9)</sup>	32
EU	330.000	7.560.072 <sup>(10)</sup>	23
Weltweit	3.000.000	32.000.000 <sup>(11)</sup>	11

(IDC 2006, Koomey 2007, EITO 2007),

- Large hosters accommodate up to 70,000 servers in their data centers
- Google is estimated at > 500,000 servers
- Microsoft (Chicago) > 300.000 servers
- Other members of this "club" are e.g. Amazon, eBay, Yahoo, Facebook, etc.



1. Lakeside Technology Center (Chicago) 102,000 sqm

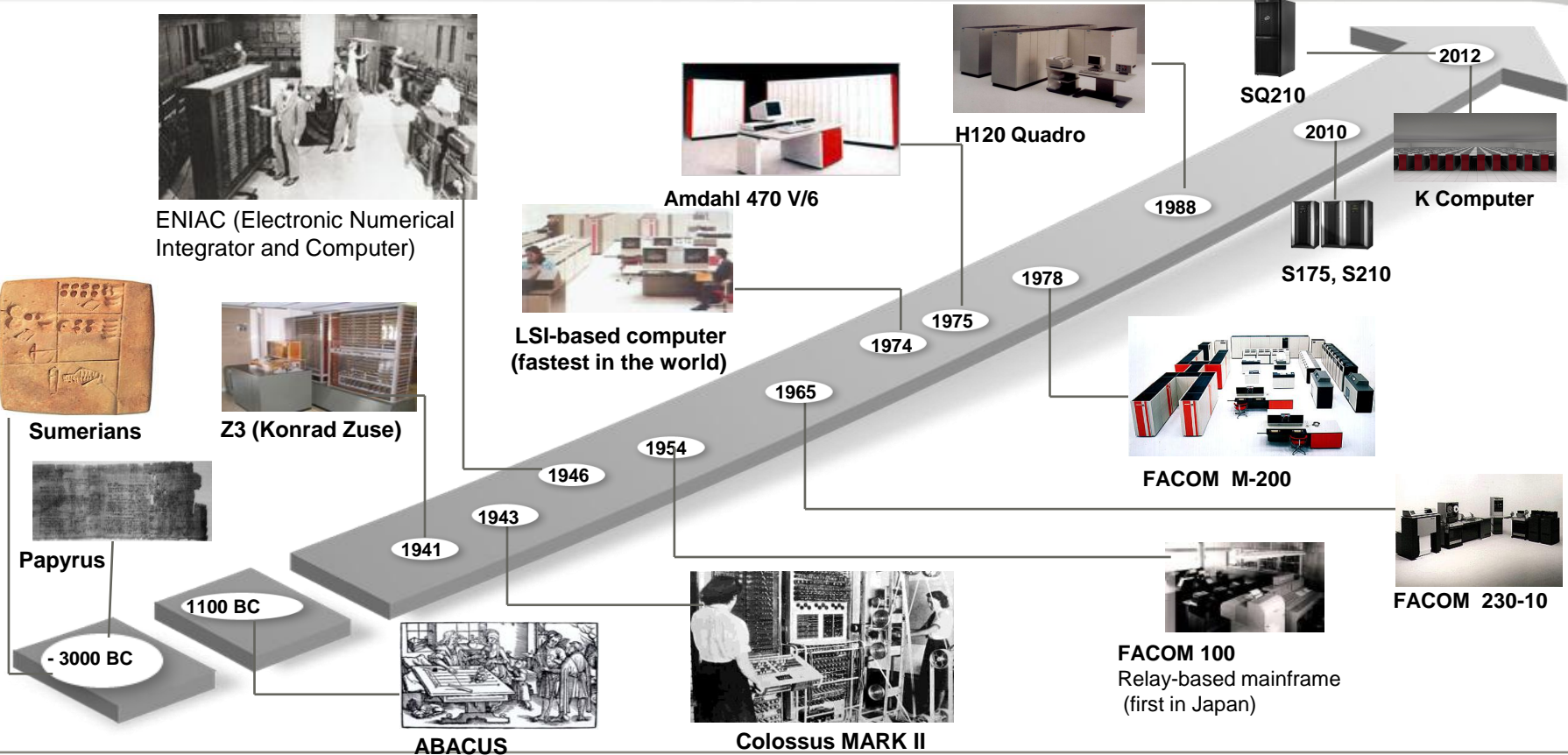


2. Metro Data Center (Atlanta) 92,000 sqm



3. NAP of the Americas (Miami) 70,000 sqm

# IT is constantly changing







What will tomorrow's data center look like?





René Descartes

I think, therefore I am



HAL 9000

I compute, therefore I am



Tomorrow's Data Center ...

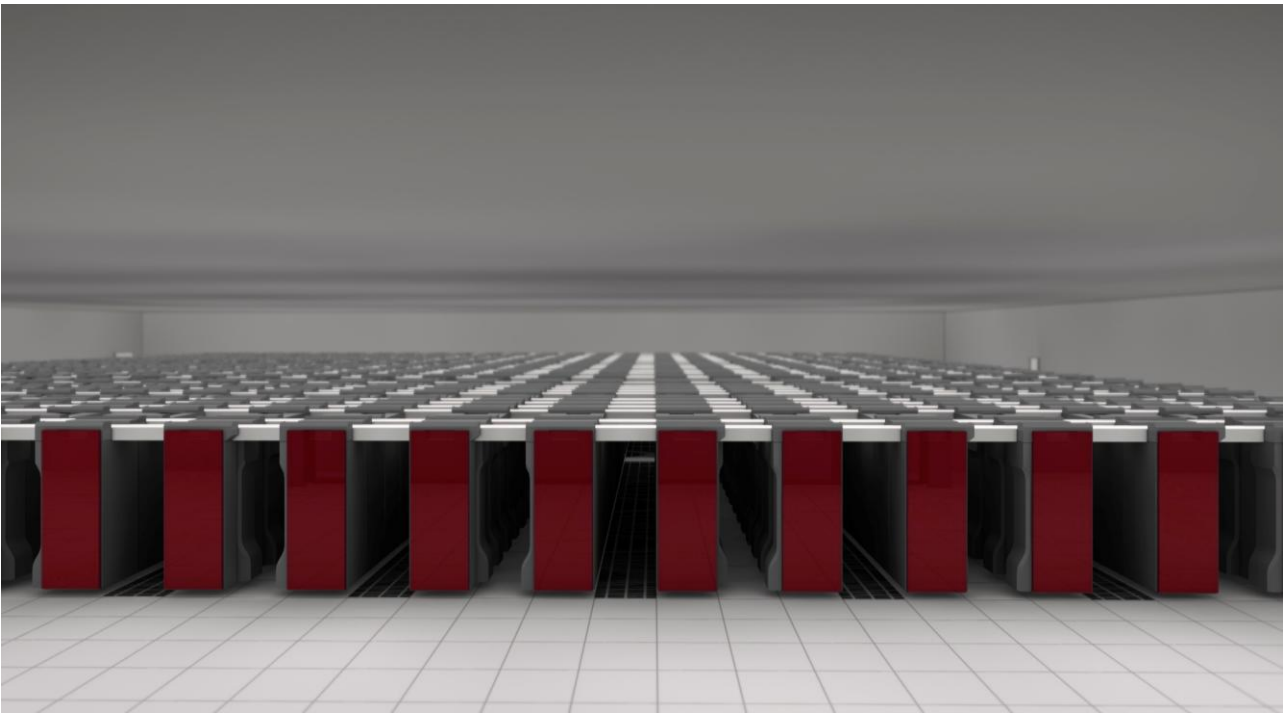
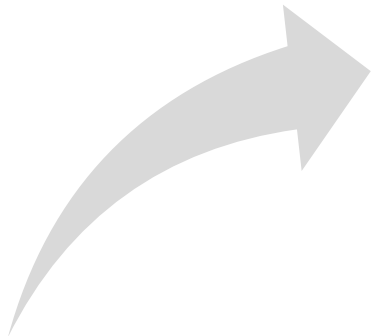




Tomorrow's Data Center

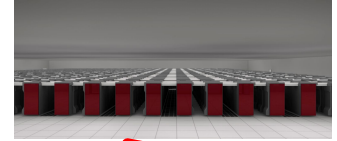
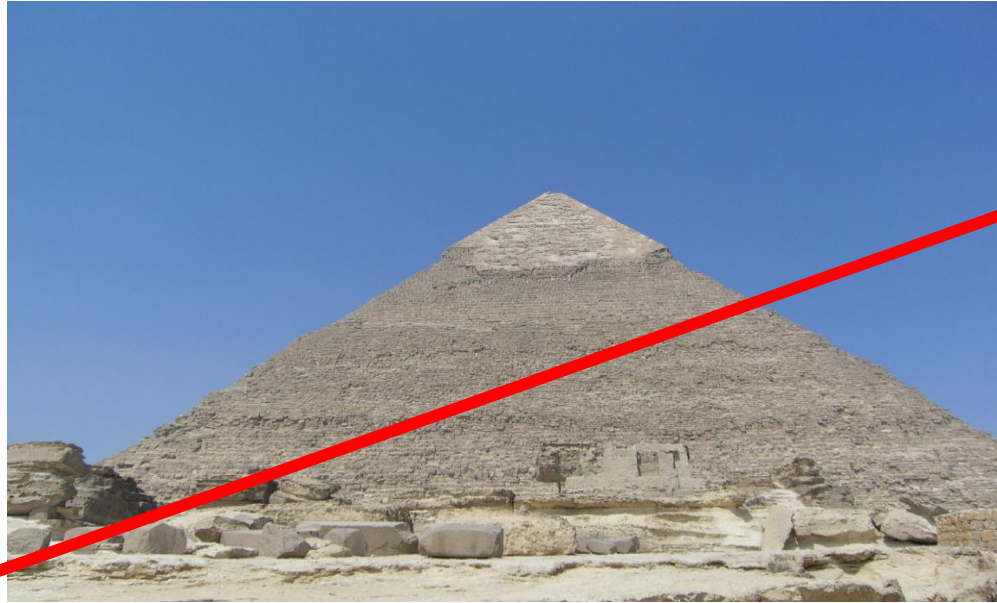
Today's Data Center

Yesterday's Data Center



# IT challenges are alike ...

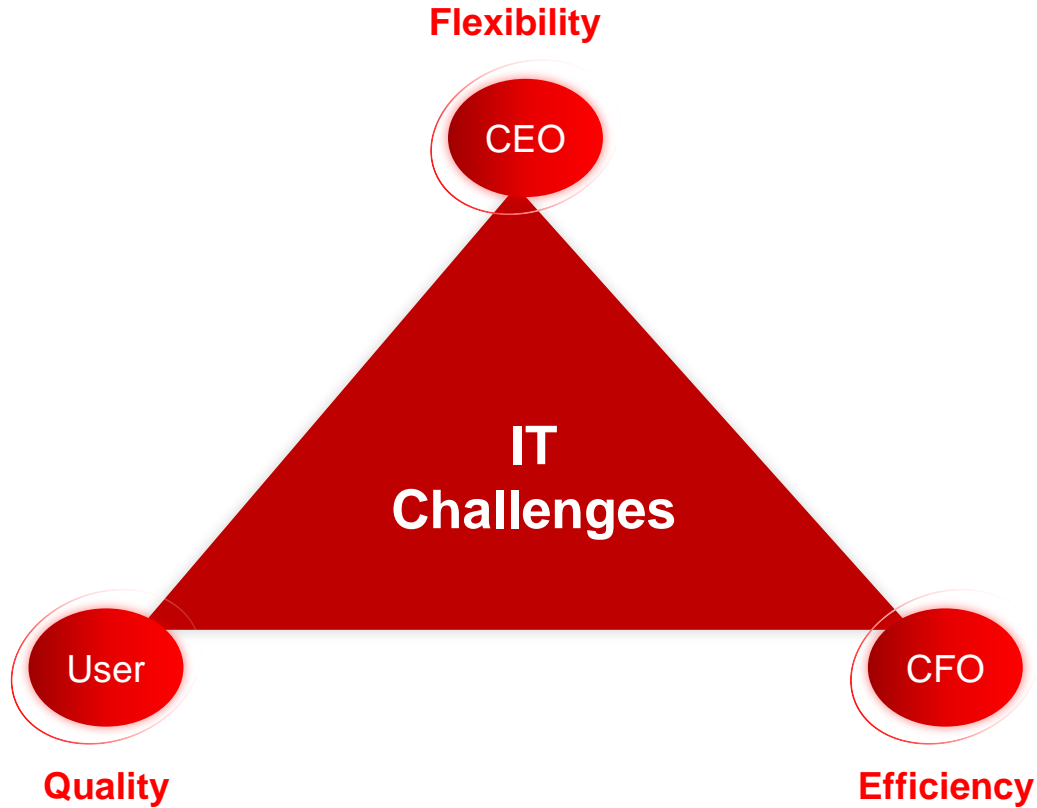
**Flexibility**



**Quality**

**Efficiency**

IT challenges have been alike to the present day ...

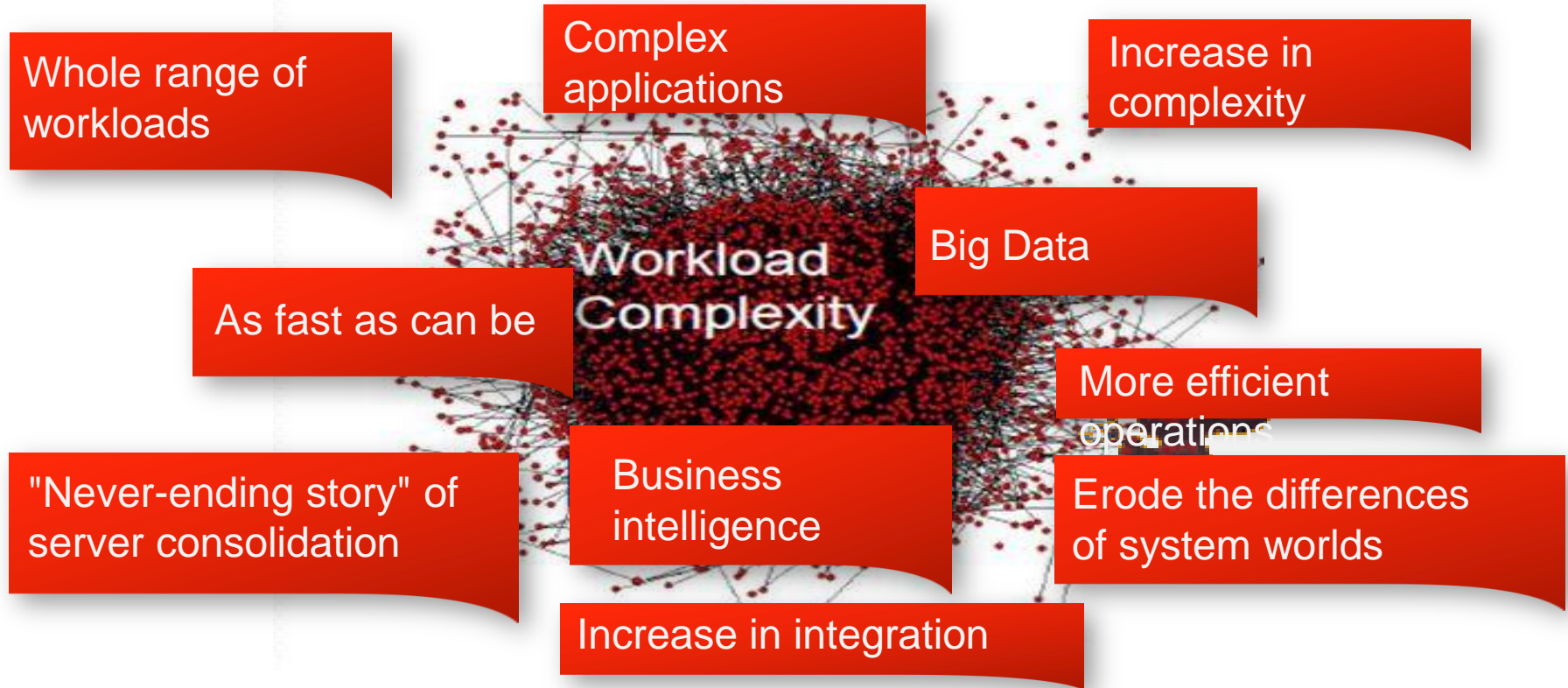


... they are becoming more varied and *faster*...





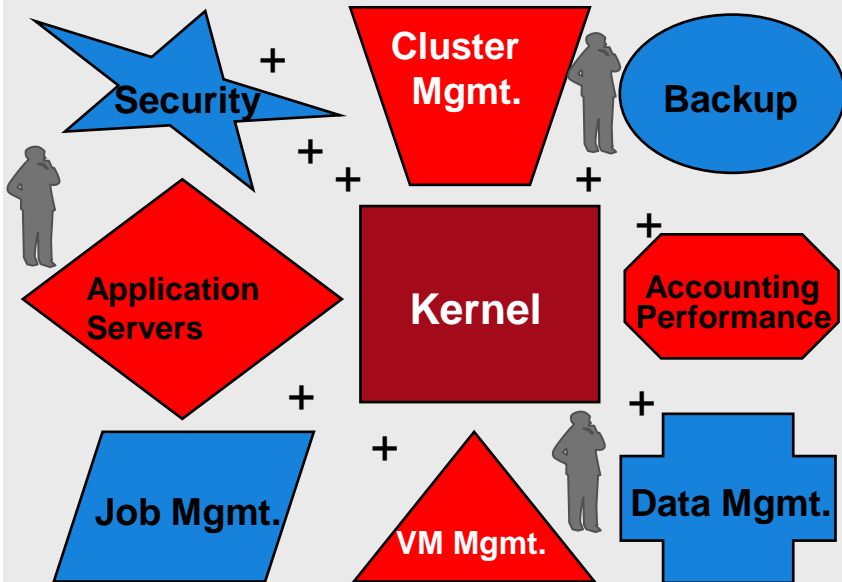
... their complexity is growing increasingly ...



# Reduce complexity with mainframes

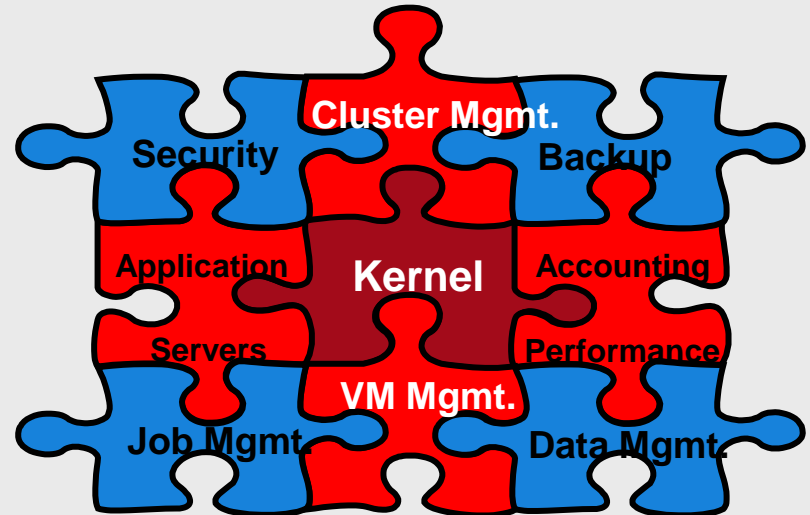
## Open world: Heterogeneous components

- high administration expenditure
- additional integration software



## Mainframe : All from a single source

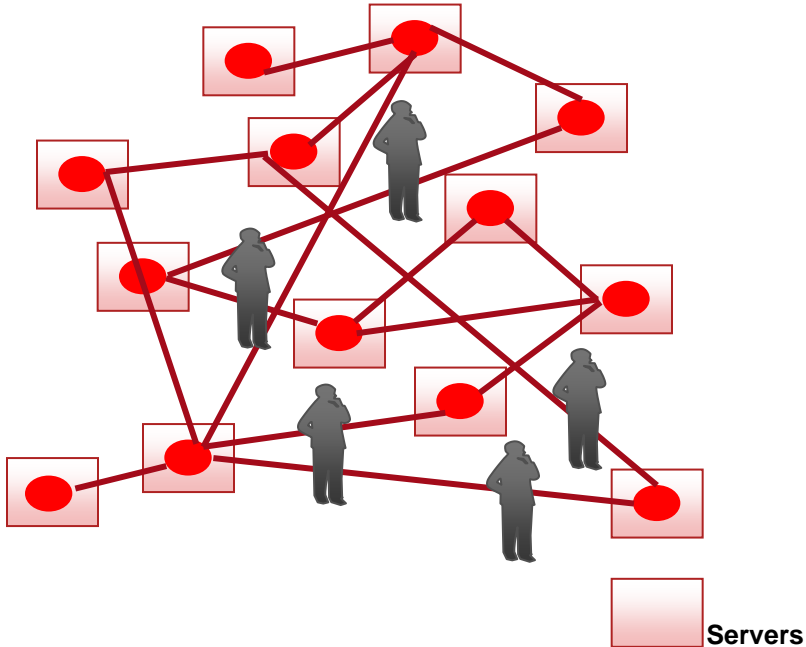
- + coordinated, ready and consistent data center infrastructure
- + low administration expenditure
- + pre-integrated components



# Reduce complexity with mainframes

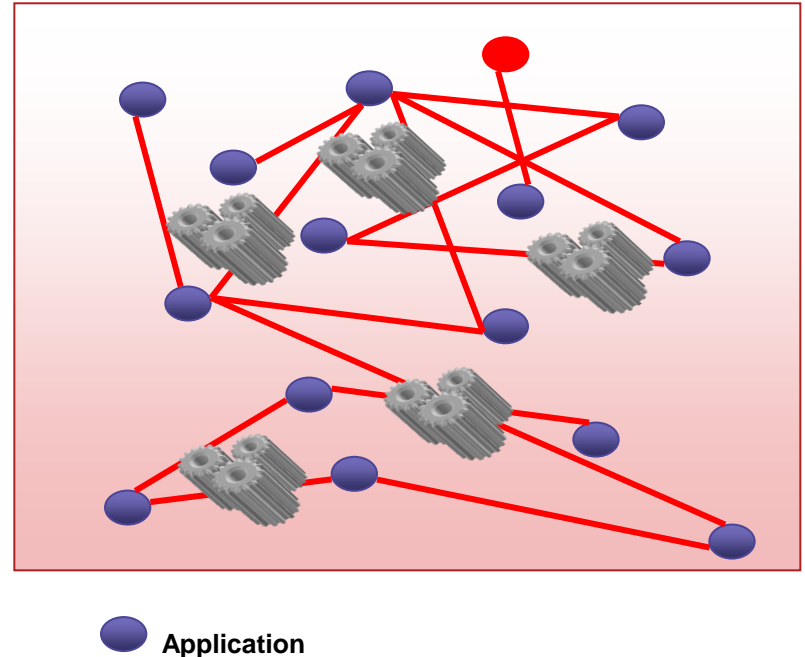
## Distributed applications

Complexity must be handled by administration



## Mainframe systems

Self-organization encapsulate the complexity



# IT challenges of today and tomorrow

## ■ Flexibility

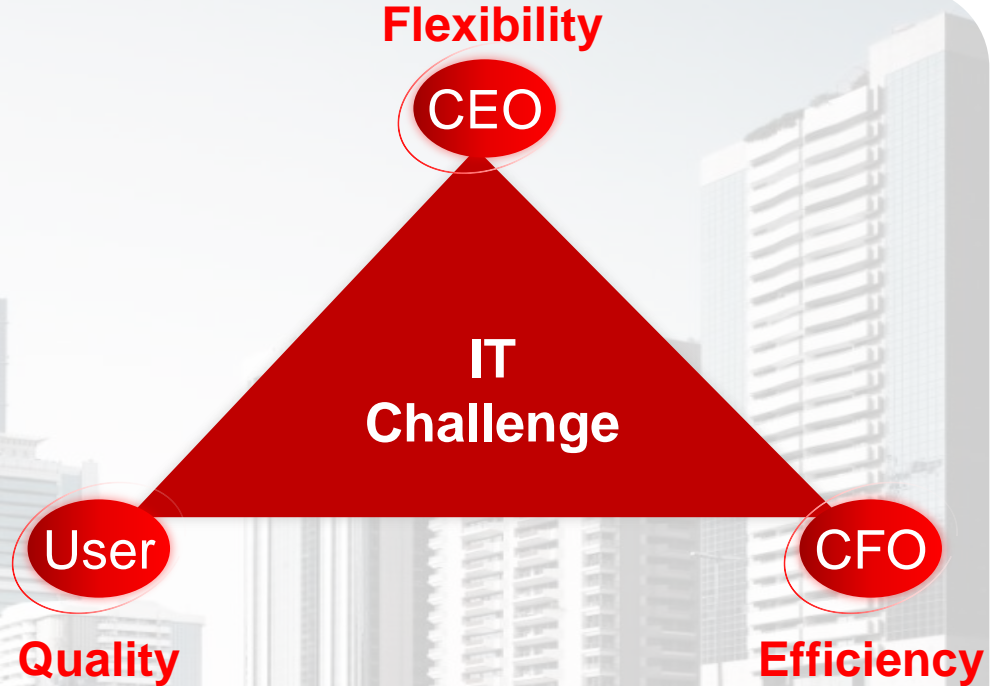
- Fast reaction to business requirements
- Service adapted at short notice
- Development of new services

## ■ Efficiency

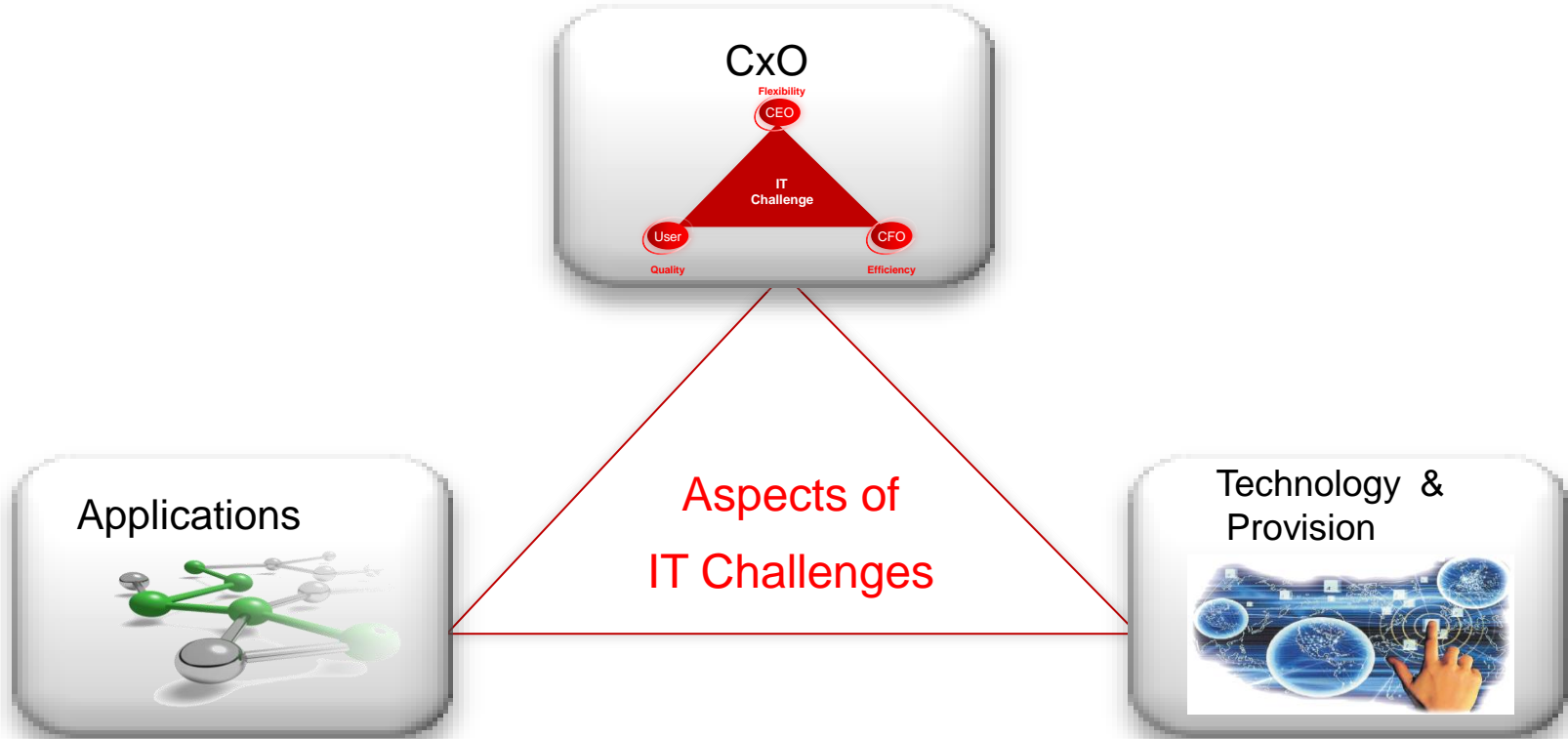
- Reduction in complexity and costs
- Transparency
- Cash flow
- Reduced risks
- Conformity with the law

## ■ Quality

- Better service levels
- Productivity
- Satisfaction of the end users

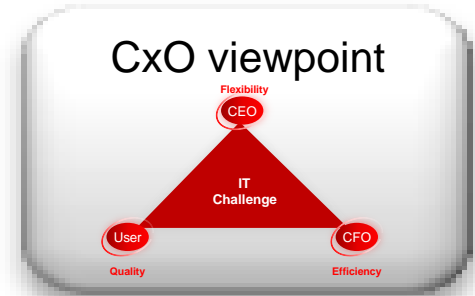


# IT challenges of today and tomorrow



# Mainframes from a CxO viewpoint

- Availability / Continuity
  - High availability - least downtimes in the normal IT lifecycle (99.999%) as in the case of an error or a disaster
  - Maximum degree of virtualization and automation  
Full automation of daily IT operations
  - Investment protection through source and object compatibility over very long periods and different HW technologies
- TCO / Efficiency / Cost control
  - Maximum economic viability with a high number of end users (TCO per user)
  - Optimal consolidation platform
- Flexibility / Agility
  - Scalability over very wide performance ranges without any leaps in technology
- Proven quality and customer support
  - Full control of the system via the SW configuration
  - Pre-tested HW configurations including peripherals
  - Third-level support from the manufacturer and customer proximity



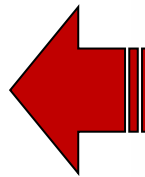
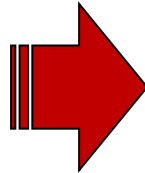


# Mainframes from an application viewpoint

- Continuity, reliability, longevity
- Investment protection over longer periods in case of technology innovations and / or changes of platform
- Flexible and fast adaptation to changed business requirements
- Further use of legacy applications as well as reliable use/further development of core applications
- Connectivity with new / changed applications:
  - Mobility
  - Web-enabling
  - Business Intelligence
  - Offload scenarios
  - SOA / SOI
  - openSEAS



# Challenges cause trends ...



...Trends cause challenges

Tomorrow's Data Center

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Yesterday's Data Center

Mainframes & IT Trends

Cloud



Mobility

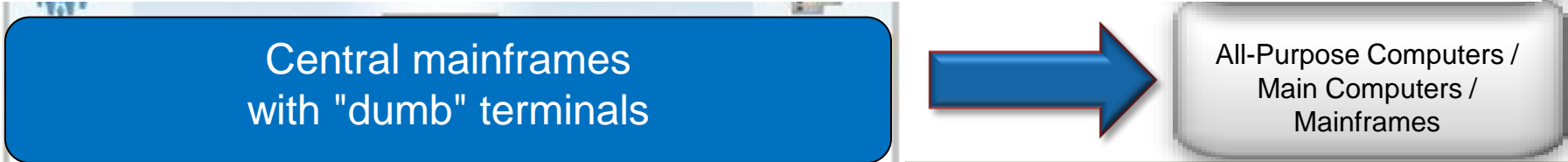


Big Data/  
Analytics



Social  
Business

# Data Center Trends



Central mainframes  
with "dumb" terminals

All-Purpose Computers /  
Main Computers /  
Mainframes

Period of "wars of religion"  
between mainframes,  
multi-station systems  
and single-station systems



Client Server /  
Distributed IT /  
Multi-Station  
Systems /  
PCs / Solaris / Unix /  
Linux ...



All-Purpose Computers /  
Main Computers /  
Mainframes

# Data Center Trends

What counts in future is the method of provision:

Decide on requirements -  
have to provide appropriate technologies



Cloud      Mobility  
Big Data/  
Analytics      Social  
Business



Client Server /  
Distributed IT /  
Multi-Station  
Systems /  
PCs / Solaris / Unix /  
Linux ...



All-Purpose Computers /  
Main Computers /  
Mainframes



# Technology and Provision



Technology & Provision



Client Server /  
Distributed IT /  
Multi-Station  
Systems /  
PCs / Solaris / Unix /  
Linux ...



All-Purpose Computers /  
Main Computers /  
Mainframes

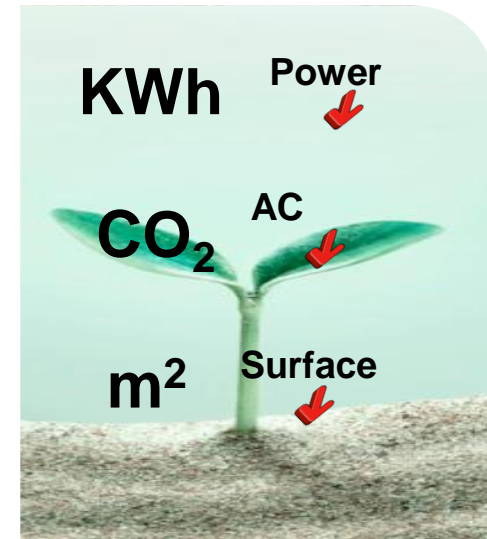
# Trend: Pre-configured systems ....@ BS2000

- Integration and interaction of different components is one of the core strengths of mainframes
- BS2000 innovation packages & pre-configured systems
- Interaction of all BS2000 infrastructure components is guaranteed
- Further current examples from the up-to-date FTS portfolio:  
(Infrastructure Solutions / Appliances)
  - Fujitsu HANA Appliance
  - FlexFrame for SAP
  - FlexFrame on Windows for SAP
  - FlexFrame Compact for SAP
  - ManageNow
  - DI Blocks
  - Dynamic Infrastructures for VMware vCloud
  - Virtual Client Computing Solutions
  - ETERNUS CS
  - ETERNUS CS 800



# Trend: Green IT ....@ BS2000

- Joint use of resources for all applications & services
- Maximum utilization has always been a features of mainframes
  - Idling servers consume almost the same amount of current as under normal load (plus additionally required cooling also necessary)
- Shared storage systems and disk allocation (better disk use supports energy efficiency)
- Consolidation and automation save >75% of the energy costs
  - Mainframes are world champions when it comes to consolidation and automation
- High energy efficiency if new mainframes are used
  - Approx. 20% less energy consumption than with S165 / S200 (server and cooling)
  - At the same time system performance is up to 20% higher
- Eco friendliness
  - Significantly lower energy consumption of new servers protects the environment and climate
  - New environmentally conscious powder coating of the housing finish
- Small footprint and maintenance space of the mainframes
  - Minimum space requirement, yet at the same time high performance and functionality



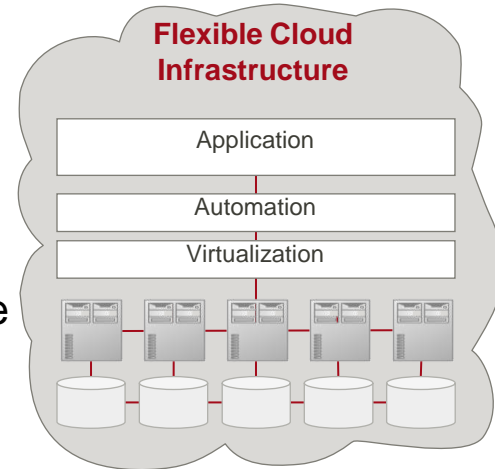
# Trend: Automation & Efficient Management ....@ BS2000

- Maximum degree of virtualization and automation
  - Full automation of first-level support possible
  - Over 20 years of experience with virtualization (VM2000)
- Optimized and absolutely secure resource management and resource sharing
- Developed for highest demands of multi-user and mixed-mode operations
- Sophisticated user and role concept
- Maximum know-how with dynamic and flexible resource management
- Multiprogramming
- Lowest personnel costs
- .....

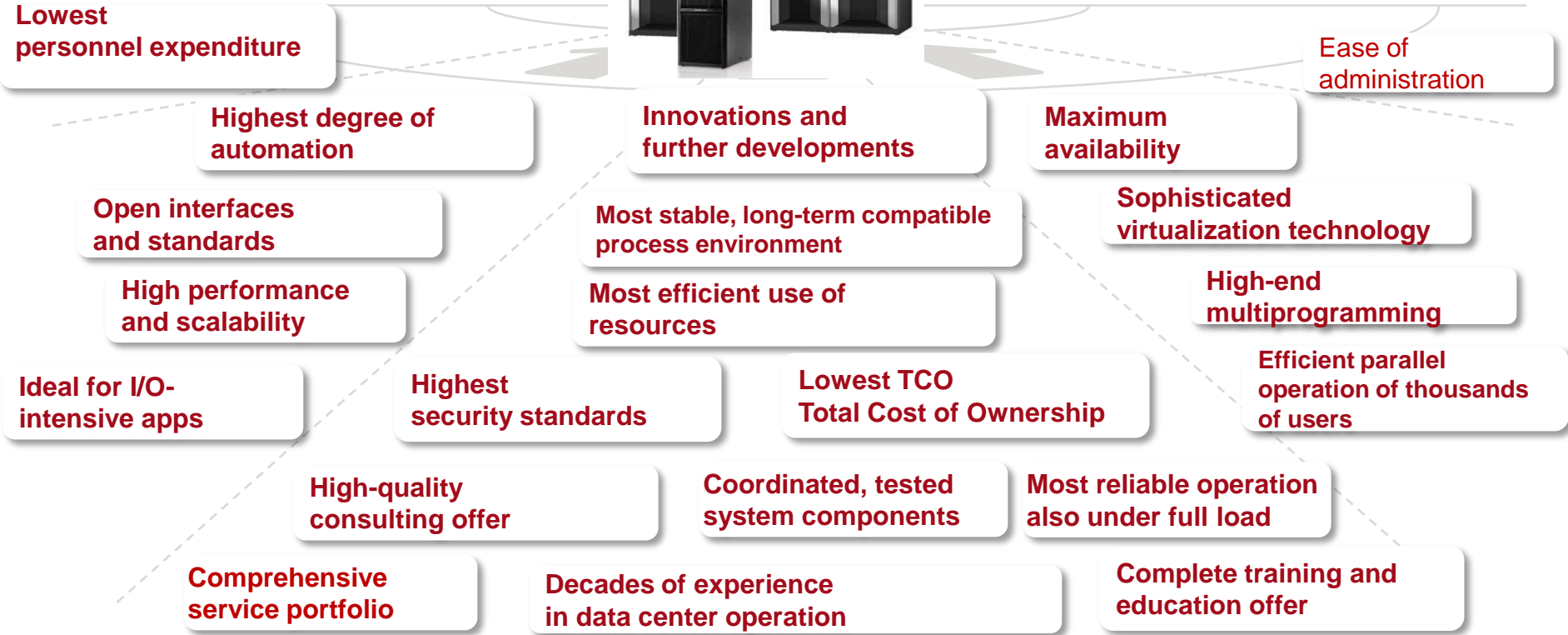


# Trend: Cloud ....@ BS2000

- "A cloud is actually nothing more than a very highly scalable, globally accessible, constantly available, high-performance and centrally managed hardware platform  
..... a great many people also call it a mainframe!"
- Clouds can be implemented with the most varied concepts - mainframes are only an alternative here, ..... presently already available in the role an in-house cloud!
- According to Gartner availability is one important criterion for cloud services. Leading-edge providers must ensure availability of 99.95% ... mainframes offer 99.999%!
- Connectivity between all the instances, interface compatibility, in addition to system stability that is to be fully maintained as well as highly flexible adaptability so that the required services are available ... Classic mainframe characteristics: mainframes are extremely flexible and react automatically to peak loads!



# Best prerequisites for the DC of tomorrow





# The ideal solution: Combination of the advantages



- Highest selection of standard applications
- Best prerequisites for distributed applications
- Highest freedom of configuration for hardware / software
- Highest freedom in choosing the programming language
- Best support for individual applications
- Lowest expenditure for administration and maintenance
- Highest number of users and transaction rates
- Absolute reliability and security
- Comprehensive support from the manufacturer



**Standard Industry Servers**

**Linux Servers**

**Unix Servers**

**Mainframe Servers**

Shared Management  
Shared Use of Resources

Industry standards

Mainframe expertise



**Standard Industry Servers**

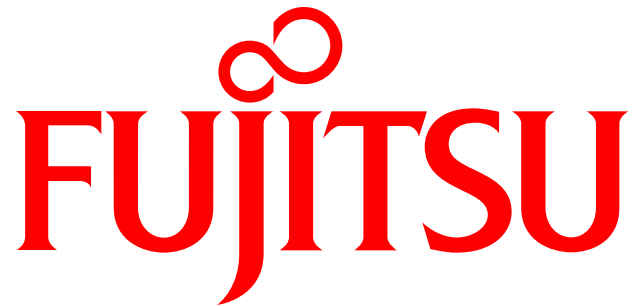
**Linux Servers**

**Unix Servers**

**Mainframe Servers**

# Mainframes: Fit for tomorrow's data centers





shaping tomorrow with you