

# ***The Prediction of the Future based on 44 Years Experience with IBM***

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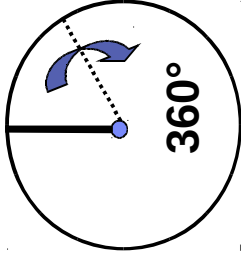
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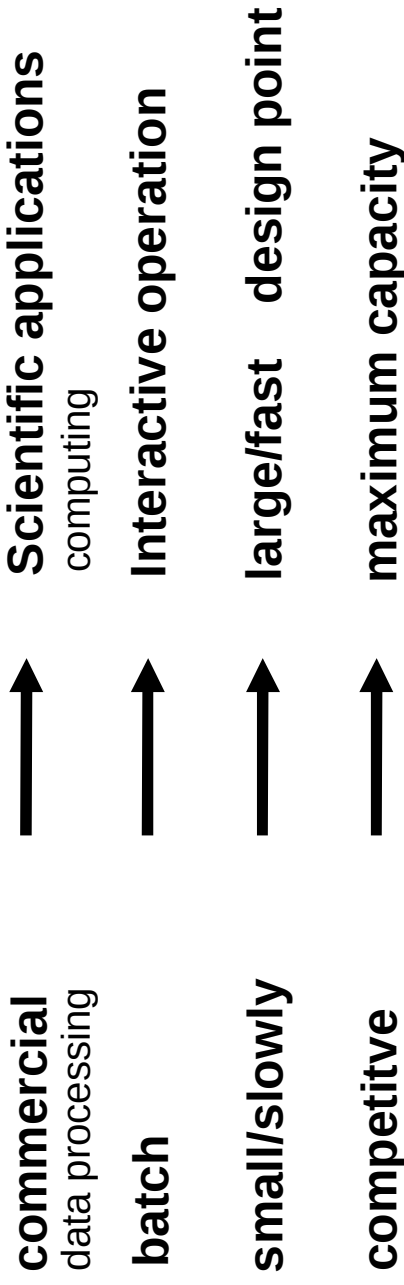
# IBM Mainframe Architecture for ever

**7 April 1964** **IBM announces System 360**

Chief architects: Amdahl, G.A. Blaauw, F.P. Brooks



**A good architecture is consistent: orthogonal, proper, general  
A Platform for all Requirements**



Microcode for design scaleability  
Machine check interrupt instead of clock stop for availability

## 5 Parallel System Development Projects (Locations)

**Böblingen**   **Hursley**   **Endicott**   **Poughkeepsie**   **Kingston**  
 Small, inexpensive   Maximum Processor Performance  
 integrated I/O   and I/O Bandwidth

1964	S/360 RA	Mod. 20 0,02 Mips	Mod. 45	Mod. 35	Mod. 65 2,3 Mips	Mod. 95
1972	S/370 VA	Mod. 125/115 0,06 Mips	Mod. 145	Mod. 135	Mod. 165 2,4 Mips	Mod. 95
1981	S/370XA 31 Bit	4331/61 1,1 Mips	—	Mod. 4341	Mod..... 7,2 Mips	
1985	S/370 ESA LPAR	9370 0,5 Mips	—	Mod. 2 Mips	Mod. ....H2 2,5 - 23 Mips	
1990	S/390 ESA ESCON	9221 6 Mips	—	—	Mod. .... H5 13 - 45 Mips	
1994	ES/9672	G1 12 Mips G2 18 Mips G3 36 Mips	G6 200 Mips		HMC	G4 50 Mips G5 100 Mips

## IBM /360 Mod. 20

Architecture Subset  
 CKD Architecture implementation on a Fixed Block Disk  
 DPS I/O Macros, 4K Supervisor, Disc Support  
 PL/1 Compiler 56 Phases  
 One Day Link Edit of User Program  
 24000 Customers



## IBM /370 Mod. 125

Modular Design CPU  
 I/O Processors  
 Service Processor



## Mod. 115

## Future Systems

Object Oriented Processor  
 Full Wafer System targetted  
 Two Interpreter Implementations Day needed to be 96 hours  
 One Level Store  
 Standard Source Sink

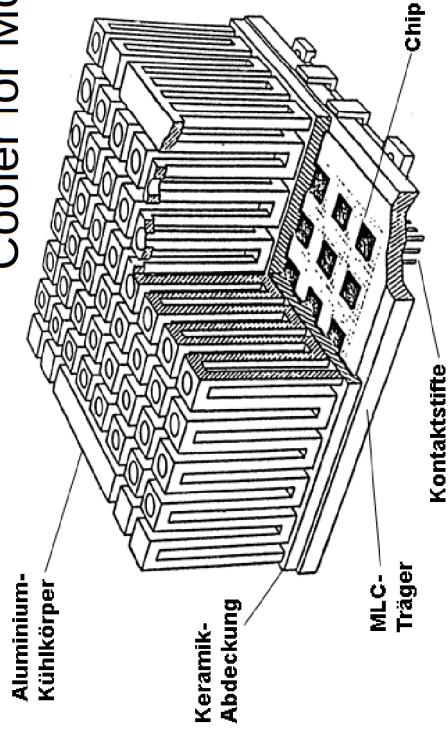
## IBM 4331

ECKD Emulation in Processor for integrated Disc Attachment

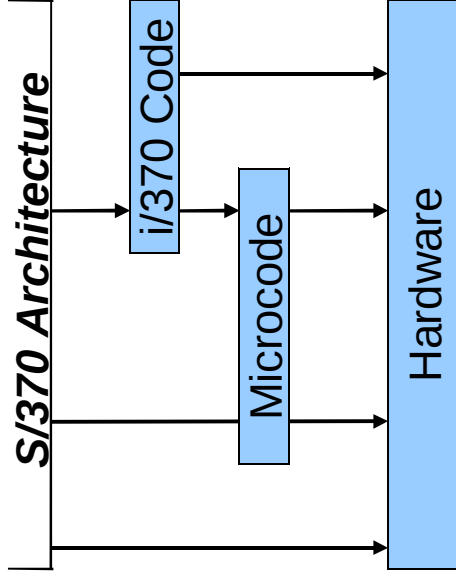
## IBM 4361

First Aircooled TCM Behr Stuttgart

Cooler for Motorbikes



i/370 Mode I/O Subsystem



## Fixed Block Architecture

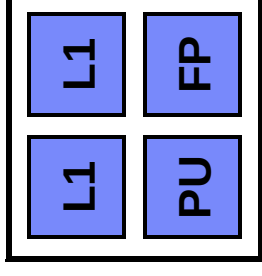
Fixed Block DASDs      VSAM Fixed Block Data Management System

Fixed Block DASD Support in Operating Systems  
VM and DOS implemented  
MVS rejected (80 Byte Card Format Runtime Libraries)

## Assignment: Technical Assistant to VP Development

### ES/9370

RISC Architecture based S/390 Emulation  
Capitol chip set (1 Mips) as cost reduction (Mod. 50)



### ES/9221

First CMOS System with SAP (I/390 Mode)  
Distributed System Structure  
High End Channel implementation (H2)  
Multiprocessor System

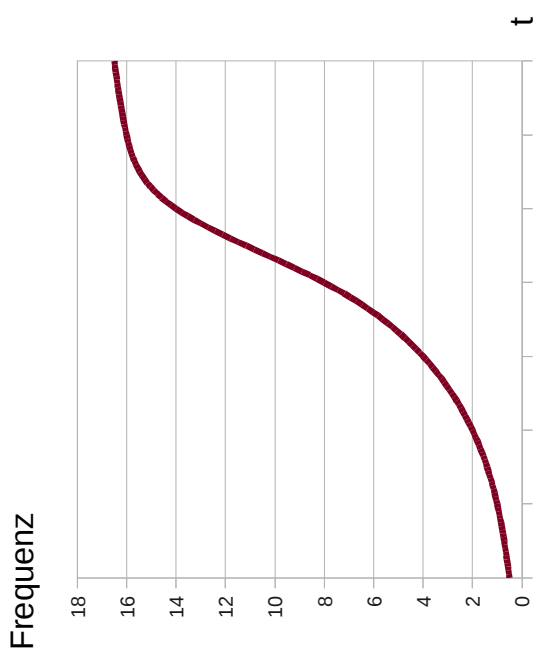
## ES/9672

G1, G2, G3 (BOE) Brainiaks  
 G4, G5 (POK) Speed Demons  
 G6 Global Lab

Common System Structure  
 Logic, I/O Control distributed (BOE)  
 Power Packaging, Cooling centralized (POK)

## Multiprise 2000/3000

G3/G5 based  
 SCSI / IBM SSA FBA disc controller emulated ECKD Control Unit in Processor



## System Z (64 Bit)

Z 900  
 Z 990  
 Z 9  
 Z 10  
 Z 196

Z 800  
 Z 890  
 Z 9 BC  
 Z 10 MR

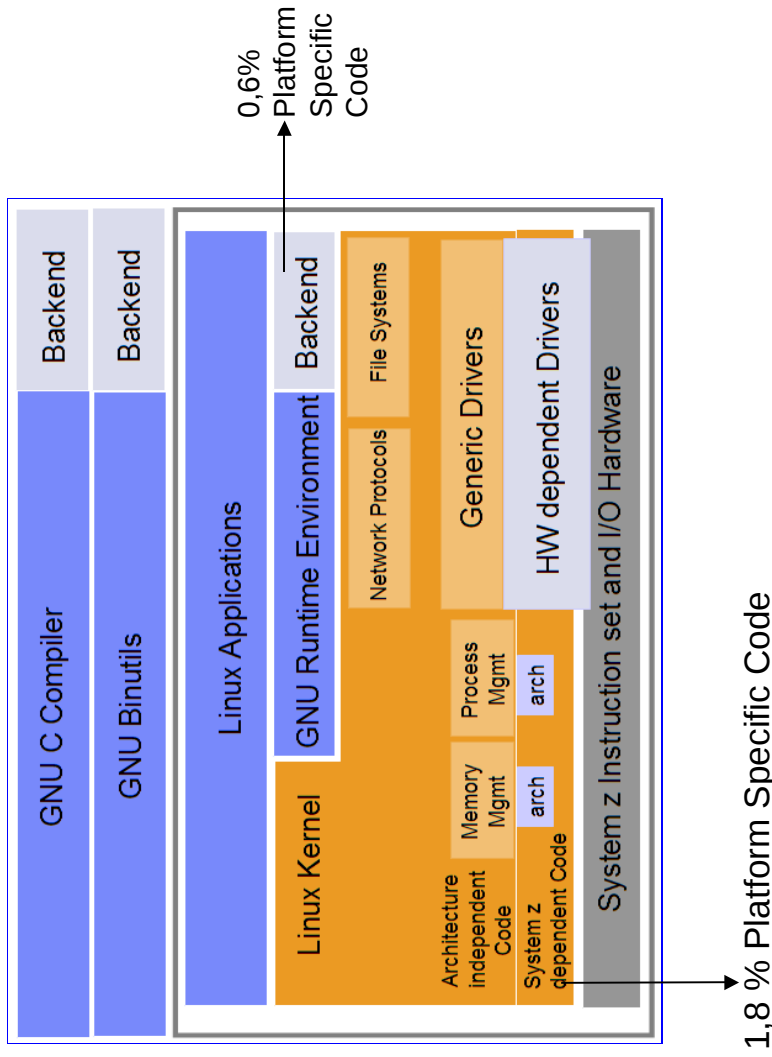
Linux Enterprise Server

# Linux on the Mainframe is Linux

Everything relevant to Linux and System z is given to the community

Runs either native  
or with z/VM as a Hypervisor

Complements other Operating  
Systems IBM System z



... and Linux on IBM System z exploits the unique values of the platform!



# The IBM zEnterprise System:

Unified management for a smarter system:  
**zEnterprise Unified Resource Manager**

- Part of the IBM System Director family, an integrated System z management facility responsible for zEnterprise platform management
- Unifies management of resources, extending System z qualities of service across the zEnterprise System

The world's fastest and most scalable enterprise system:  
**IBM zEnterprise 196**

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux consolidation
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

Scale out to trillion of instructions per second:  
**zEnterprise BladeCenter Extension (zBX)**

- Selected IBM POWER7 blades and System x Blades\* for tens of thousands of AIX and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network



## **Future System z Architecture Integration**

- Channel Subsystem
- ECKD-Disc Control Unit
- Crypto Attachment
- Communication Subsystem

## **Quality of Service Optimizer**

- Internal Linux MCP Partition based (Firewall)
- Logical ZOS Partition based (Enterprise Key Store)
- Bedrock managed

## **Data Center in a Box**

- Future Infrastructure with High Performance internal switch
- Processor Elements, Management Elements, Storage Elements
- Industry Standard I/O

## The Future of IT (Lars Thomsen)

**Today**      **Accumulated intelligence of a personal computer equals  
brain power of a fly**

Human serves computer

**In 260  
Weeks**      **Accumulated intelligence of a personal computer equals  
brain power of a dog**

May be trained as guide dog

**In 520  
Weeks**      **Accumulated intelligence of a personal computer equals  
brain power of a Human being**

Computer will serve Human as a partner