

**Nothing Stops It.**

# OpenVMS History

---

**Ruth Goldenberg**

**[Ruth.Goldenberg@hp.com](mailto:Ruth.Goldenberg@hp.com)**

## In the Beginning

**Confining Software Environment, Limited  
Scaleability, Incompatible Systems**



- ◆ **PDP-11 Popularity**
- ◆ **16-bit Architecture**
- ◆ **Architecture Limitations**
- ◆ **1974: Should we build a 32-bit PDP-11?**

# 1975: STAR and STARLET goals

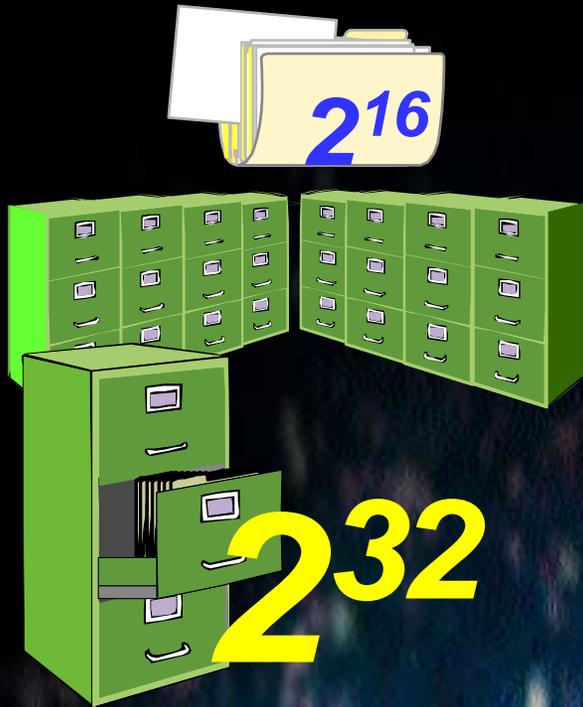
Beginning a 20 year tradition  
of shattering barriers and breaking the rules



- ◆ April 1975: Gordon Bell says “Go”
- ◆ Integrated Hardware and Software Design
- ◆ Expand Addressing to 32 Bit
- ◆ Highly Scalable Architecture
- ◆ One System, Compatible Tools

## Do The Math

$2^{32}$  Is A Whole Lot More Than Two Times  $2^{16}$



- ◆ Eliminates Software “Overlays”
- ◆ Critical Software (e.g., RMS) Stays Resident
- ◆ Improved Performance
  - Programmer Efficiency
  - Program Execution

## VAXA Committee

---

- ◆ Gordon Bell
- ◆ Peter Conklin
- ◆ Dave Cutler
- ◆ Bill Demmer
- ◆ Tom Hastings
- ◆ Richie Lary
- ◆ Dave Rogers
- ◆ Steve Rothman
- ◆ Bill Strecker,  
chief architect

## VAXA's Architectural Goals

---

- ◆ A 32-bit virtual address space
- ◆ An instruction set optimized for high-level languages
- ◆ Data types compatible across all languages
- ◆ PDP-11 compatibility
- ◆ Easy to develop software for it\
- ◆ Single operating system for multiple markets

## Early Development

---

- ◆ Sept 1975 SRM Rev 1
- ◆ April 1976 April Task Force
- ◆ June-Aug Detailed software design

## Initial VMS Design Team

---

By November, 1975...

- ◆ Dave Cutler,  
project leader
- ◆ Andy Goldstein
- ◆ Roger Gourd,  
manager
- ◆ Roger Heinen
- ◆ Dick Hustvedt
- ◆ Hank Levy
- ◆ Peter Lipman
- ◆ Trev Porter

# Starlet Goals and Features

---

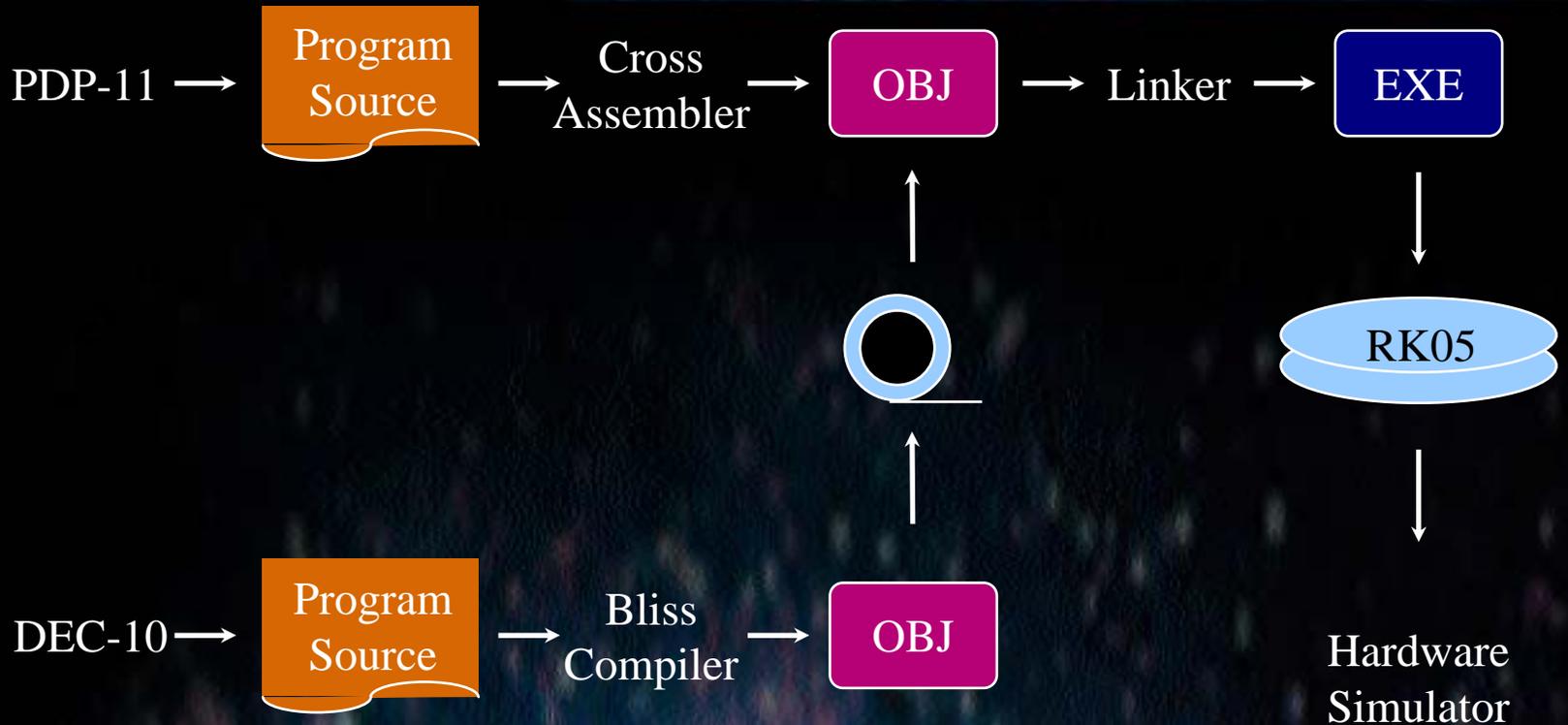
- ◆ Software quality
- ◆ Cultural compatibility with the PDP-11
- ◆ Digital Command Language compatibility
- ◆ Provide common environment for all languages
- ◆ Implement virtual memory
- ◆ Integrated networking
- ◆ CPU-independent system disk
- ◆ Strong upward-compatibility ethic

## Work in 1976

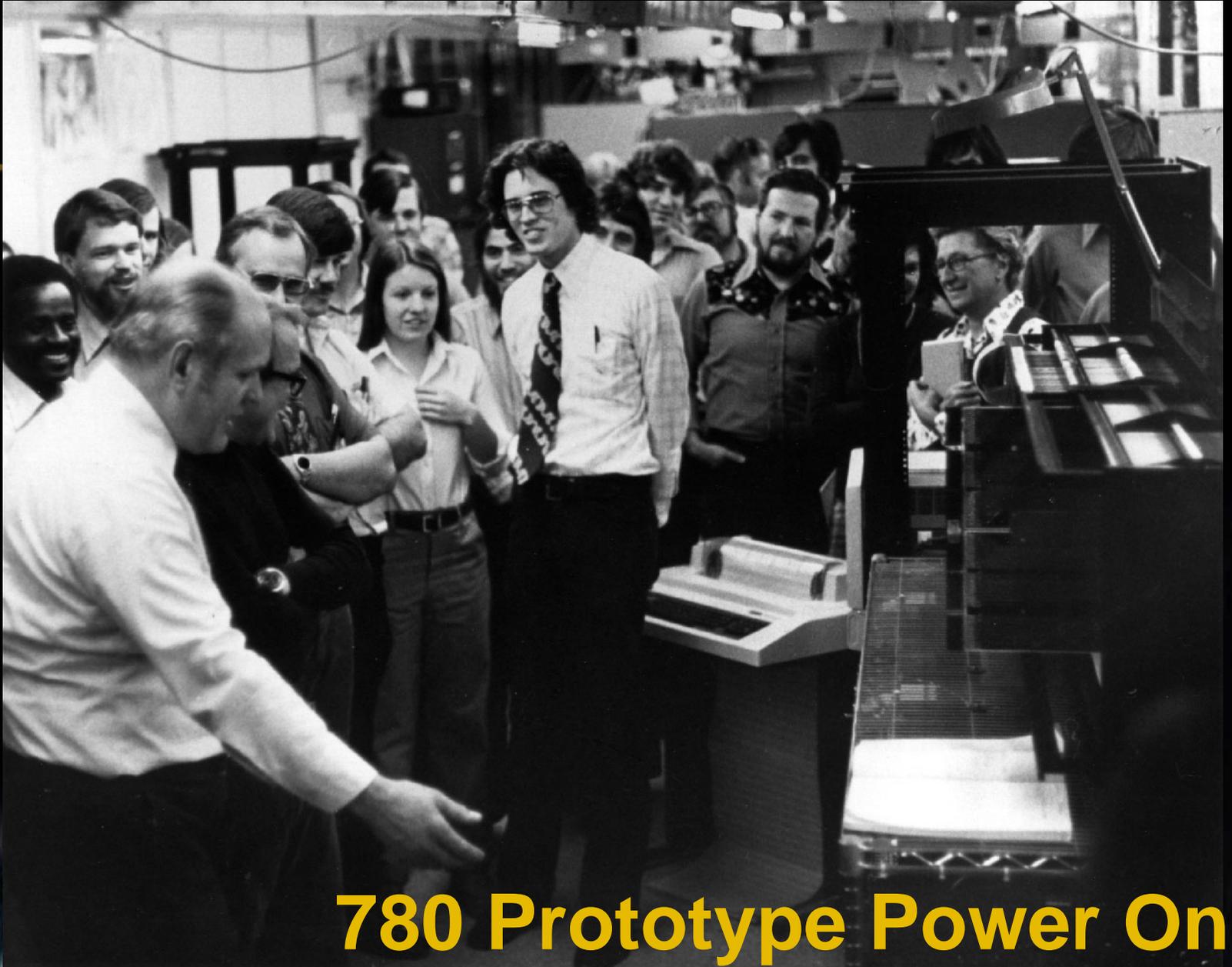
---

- ◆ Architectural design simplified
- ◆ Other organizations have assigned people
- ◆ “Do it right”
- ◆ July – the Starlet Working Design Document
- ◆ Sept. – the Starlet project plan
- ◆ Oct. – Base level 1

# Program Development and Testing



Nothing Stops It.



**780 Prototype Power On**

## Timesharing on the Prototype

---

- ◆ Prototype 780, 1MB memory
  - 2 RP06 + RK07
- ◆ VT52s in the offices
- ◆ Self-supporting
  - System builds
  - Bliss compiler
  - “Eat our own dog food”

**1977** 1978 1979 1980 1981 1982...

**Announcement of DIGITAL's  
32-bit Computing System**



- ◆ **October 25, 1977**
- ◆ **VAX-11/780**
- ◆ **VMS V1.0 Announced**

# October 1977 Announcement



Nothing Stops It.

# V1.0 Development Team



Nothing Stops It.

Nothing Stops It.

1977 **1978 1979** 1980 1981 1982...

---



- ◆ VMS V1.0 Shipped
- ◆ DECnet Phase II
- ◆ FORTRAN IV
- ◆ Up to 8 MB Memory

1977 1978 1979 **1980** 1981 1982...

Low-Cost, High-Performance Networking -- Built Right In!



- ◆ DECnet Phase III
- ◆ VMS V2.0
- ◆ New programming tools
- ◆ Ethernet products
- ◆ VAX-11/750

Nothing Stops It.

# V2.0 Development Team



1977 1978 1979 1980 1981 **1982...**

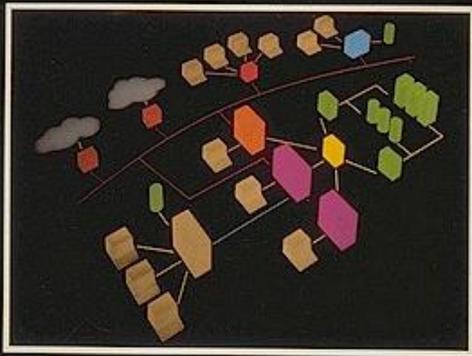
**A Long History of Growing Up -- And Down!**



- ◆ **VAX-11/730**
- ◆ **VMS V3.0**
- ◆ **RA60 and RA81 Disk Drives**
- ◆ **Digital Storage Architecture**
- ◆ **ALL-IN-1**

1983 1984 1985 1986 1987 1988...

VAXclusters -- 24 x 365 computing leadership, then and now!



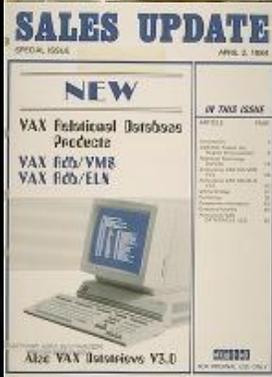
**VAXcluster**  
Technical Summary

digital

- ◆ VAXcluster Technology
- ◆ 16 Node Star Architecture
- ◆ CI Connectivity
- ◆ DECnet Phase IV

1983 **1984** 1985 1986 1987 1988...

**A Solid and Stable Production System -- For Business and Engineering!**



- ◆ VMS V4.0
- ◆ VAX Rdb/VMS
- ◆ VAX-11/785
- ◆ VAX 8600 and 8xxx
- ◆ VAXstation I
- ◆ MicroVAX I

1983 1984 1985 **1986** 1987 1988...

**VAXcluster Power, Implemented Using Cost-Effective LAN Technology!**



- ◆ VMS V4.5
- ◆ VAX 8800
- ◆ Local Area VAXclusters

1983 1984 1985 1986 **1987** 1988...

“When You Care Enough to Steal The Very Best!”



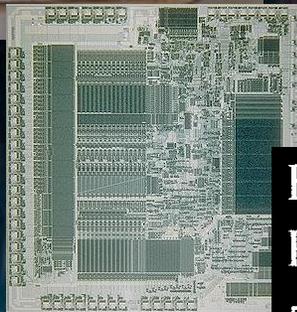
◆ VAXstation 2000

◆ MicroVAX 2000

◆ CVAX Chip...

*When You Care Enough  
to Steal the Very Best!*

◆ MicroVAX 3500 and 3600



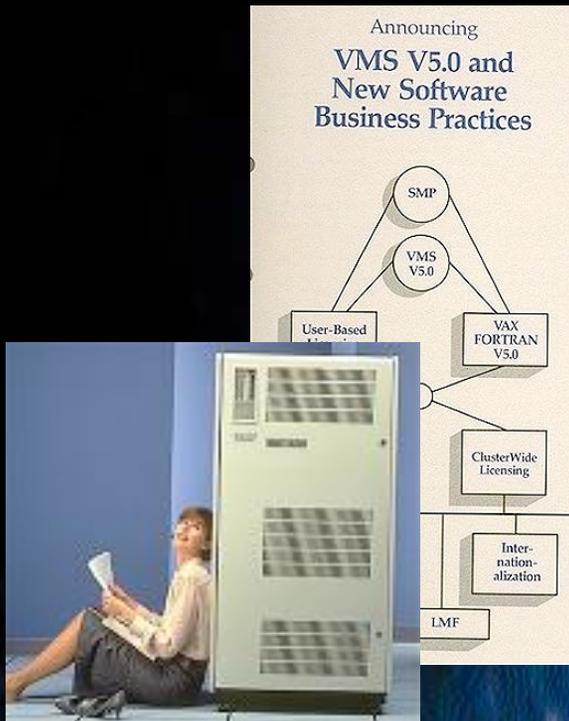
ВАС . . .

Когда вы заботите доволно  
воровать настоящий лучший

VAX . . .  
When you care enough to steal the very best

1983 1984 1985 1986 1987 **1988...**

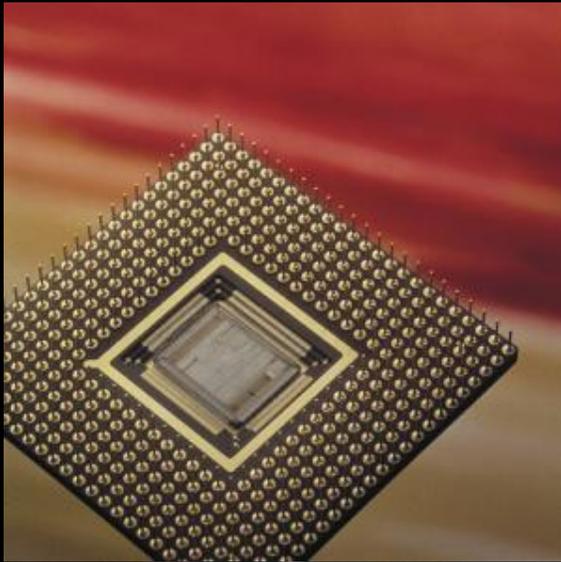
**High-Speed Internal Bus + Tightly Coupled SMP = High Performance!**



- ◆ **VAX 6000**
- ◆ **VMS V5.0**
- ◆ **Symmetric Multiprocessing**
- ◆ **VAX 6200**

1989 1990 1991 **1992** 1993 1994...

**Shattering Barriers - Again - With 64-Bit Computing!**



- ◆ **Alpha 64-Bit Processor Architecture**
- ◆ **Breaking the rules again: “You can’t port OpenVMS. It’s written in assembler!”**
- ◆ **First Release of OpenVMS AXP V1.0 for Alpha**

**1995** 1996 1997 1998 1999 2000...

---

**OpenVMS V7.0 - breaking the rules yet again**

- ◆ **OpenVMS VAX V7.0**
- ◆ **OpenVMS Alpha V7.0 with 64-Bit, VLM/VLDB Support**
- ◆ **Kernel threads**
- ◆ **The Biggest Release of OpenVMS Since V5.0**

**1995** 1996 1997 1998 1999 2000...

**Do The Math -- Again!**



- ◆ **VAX and VMS 32-Bit Addressing Capability...**
- ◆ **Q: If VAX 32-Bit Addressing Equates to 20 Minutes of TV, What Size Multimedia Can 64-Bit Manage?**

**1995** 1996 1997 1998 1999 2000...

---



- ◆ **AlphaServer and OpenVMS  
64-Bit Addressing Capability**
- ◆ **A: Every TV Show Ever Shown  
Since 1948!**

Nothing Stops It.

1998 1999 **2000** 2001 2002 2003...

**The Next Generation...*Here Now!***

The Galaxy<sup>™</sup> Software Architecture  
*for*  
OpenVMS

Digital Equipment Corporation

1998 1999 2000 **2001** 2002 2003...

---



*Intel Inside!*

- ◆ **Breaking the rules yet again:**

**What about all the special Alpha features that support OpenVMS?**

**– It's all software!**

**Nothing Stops It.**

**2001 2002 2003 2004 2005 2006...**

---

**Where Do You Want to Go - *Tomorrow?***

- ◆ **A First Class Commercial Machine**
- ◆ **For Unlimited High-end Computing**
- ◆ **On OpenVMS!**