

# **DIGITAL'S PRODUCT STRATEGY**

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**5-DECEMBER-86**

**DEC COMPANY CONFIDENTIAL - WDS 12/5/86**

## PRESENTATION OUTLINE

1. Strategy process
2. Strategy overview
3. Product strategy
4. Summary

## 1. STRATEGY PROCESS

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## STF MEMBERSHIP

- o Engineering staff
- o Functional engineering groups

# STF MISSION

To provide RECOMMENDATIONS to the Executive  
Committee and Jack Smith's Staff on Engineering  
INVESTMENT DECISIONS

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## STF GOALS

- o Provide a product strategy
  - Technology vision
  - Product vision
  - Product architecture
  - Detailed product recommendations
  
- o Consistent with
  - Corporate strategy
  - Market strategy
  - Financial strategy
  - Engineering capabilities (technical and managerial)
  - Technology and industry directions

## PRODUCT STRATEGY GENERATION

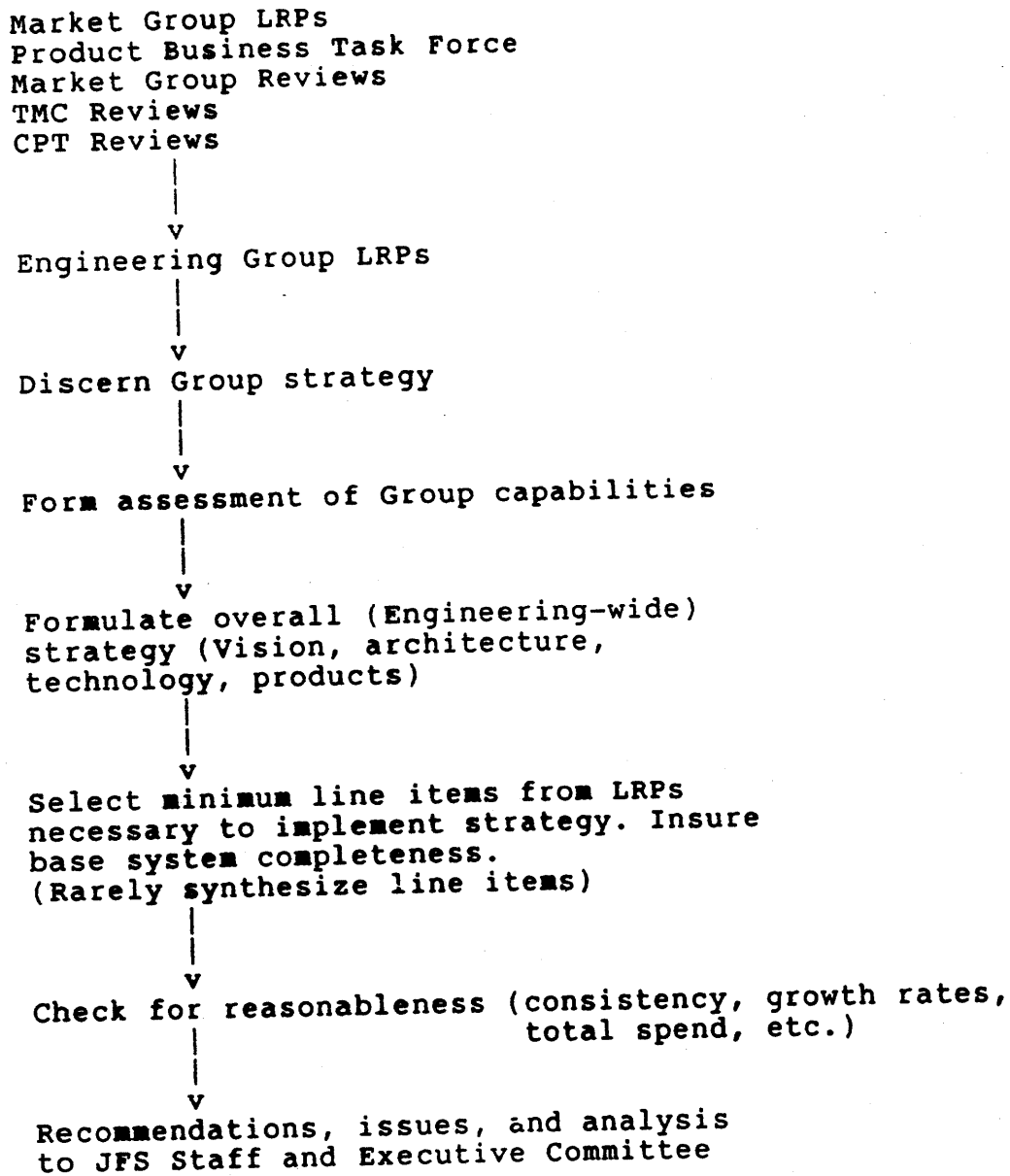
- o Functional engineering groups
- o STF review and integration
- o In exceptional cases, STF invention

## STF ROLE

- o **Technical conscience**
- o **Business conscience**
- o **System conscience** <---
  - **Clean strategy - so everyone in the highly specialized engineering organization knows what to do**
  - **Completeness of base systems**
  - **Ability to execute - within technical talent, management talent, and financial constraints**



# STF PROCESS



## **2. STRATEGY OVERVIEW**

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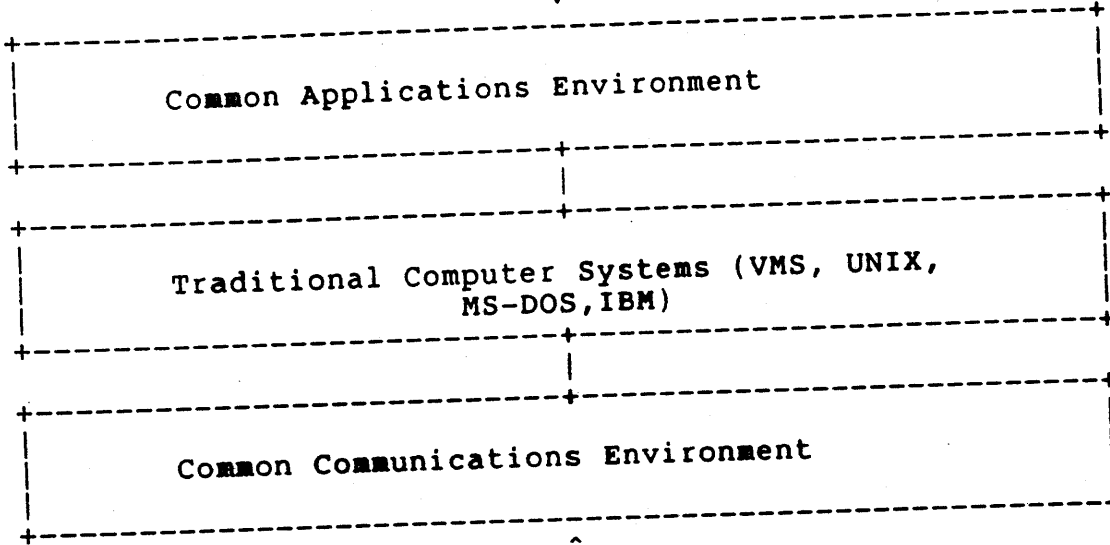
## CUSTOMER PRODUCT NEEDS

Information processing systems which enable an organization to accomplish its mission and increase its productivity

- o Complete information processing systems: computer products, communication products, service, and support
- o Organization wide sharing of data
- o Applications
  - Access to outside applications
  - Productive environment for customer developed applications
  - Partnership relationship to develop new, complex application
  - Integration of multiple applications
- o Preservation of h/w, s/w, and training investment (within and across vendors)
- o Computing price/performance that tracks evolving technology

# COMPUTING ENVIRONMENT VISION

Multiple, interoperating applications



Multi-computer, multi-vendor, multi-level and multi-departmental (within a company), multi-company communication

## BUSINESS STRATEGY ASSUMPTIONS

- o After IBM, DEC is the only full-line supplier of complete information processing systems
- o In many areas of contemporary interest (eg networks, distributed computing, ease of development, ease of use, etc) DEC has significantly superior technology and products to IBM
- o Most customers - because of their extreme dependence on information systems for their competitive advantage - will not risk trusting their information processing needs to a single supplier and will choose a real second supplier
- o DEC's size and relevant technological capabilities make it the clear choice as the first or second supplier

## **PRODUCT STRATEGY**

- o Family of computer system products ('from the desktop to the datacenter') built to a common native system architecture
- o High level of built-in distributed computing capabilities
- o Comprehensive computer networking with particular emphasis on local area networking and international standards
- o Comprehensive applications environment architecture
- o Integration of other key computing systems

## **PRODUCTS TO A COMMON NATIVE SYSTEM ARCHITECTURE**

- o Movement of data and applications within and across groups and departments in the organization
- o Ease of sharing data and building distributed applications
- o Preservation of h/w, s/w, and training investment

## DISTRIBUTED COMPUTING

- o Provides organization wide sharing of data
- o Eliminate centralized system development bottleneck
- o Take advantage of changing system technology
  - Cost performance advantage of smaller systems
  - Ease of use



## NETWORKING

- o Local area networks - the best way to build cost-effective, robust, extensible computer systems
- o International standards - multi-vendor, multi-organizational communication

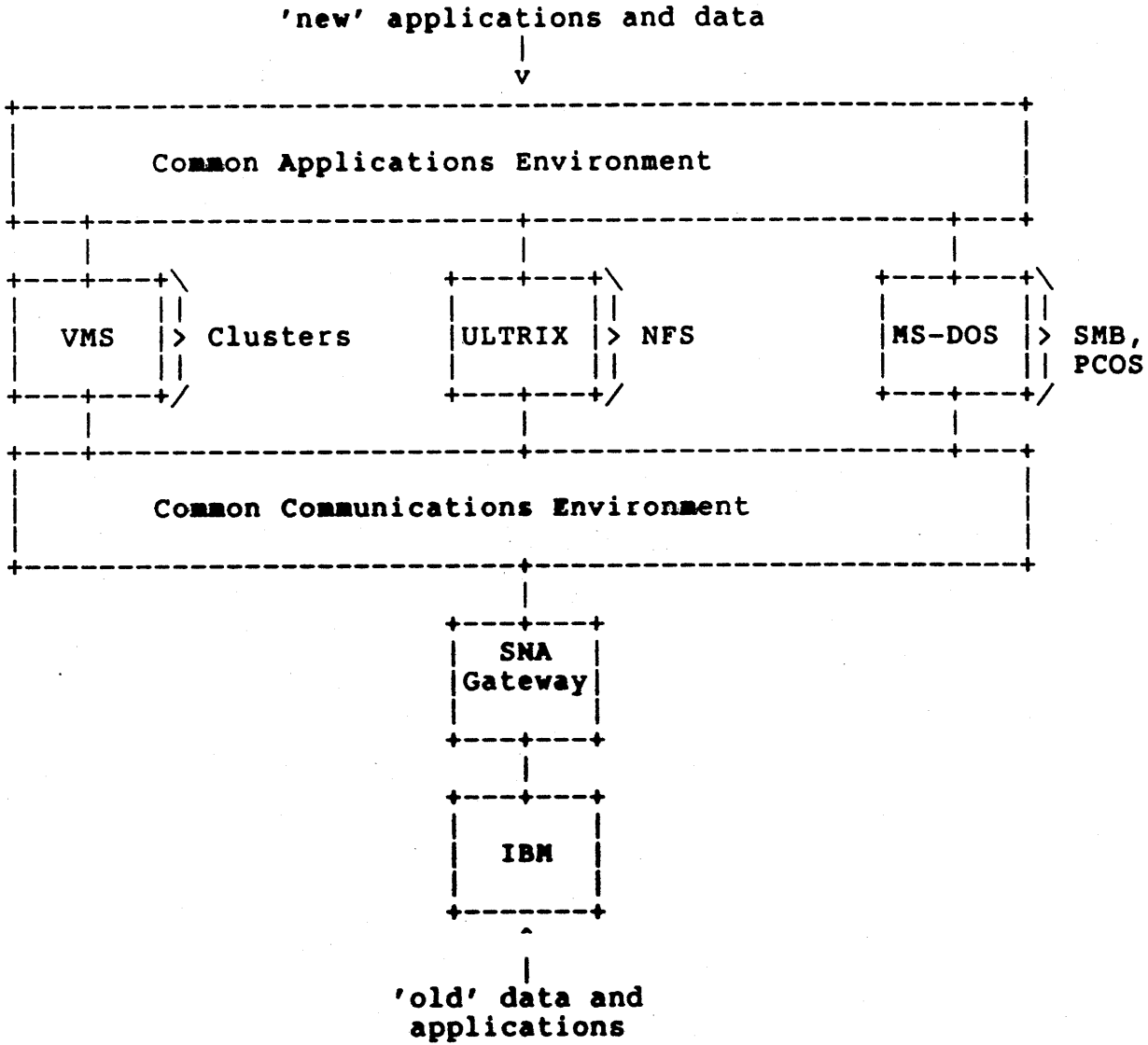
## **APPLICATIONS ENVIRONMENT ARCHITECTURE**

- o The environment to which applications are written:  
Operating system of the 1990's
- o Vision
  - High level interface specifications - graphics, printing, compound documents, etc
  - Front end common user application interface
  - Back end application data models
  - .... all provided in a distributed computing environment

## **INTEGRATION OF OTHER KEY COMPUTING SYSTEMS**

- o MS-DOS (personal computer)
- o UNIX/ULTRIX (technical workstations)
- o IBM (corporate data)

# DEC/CUSTOMER INTEGRATION VISION

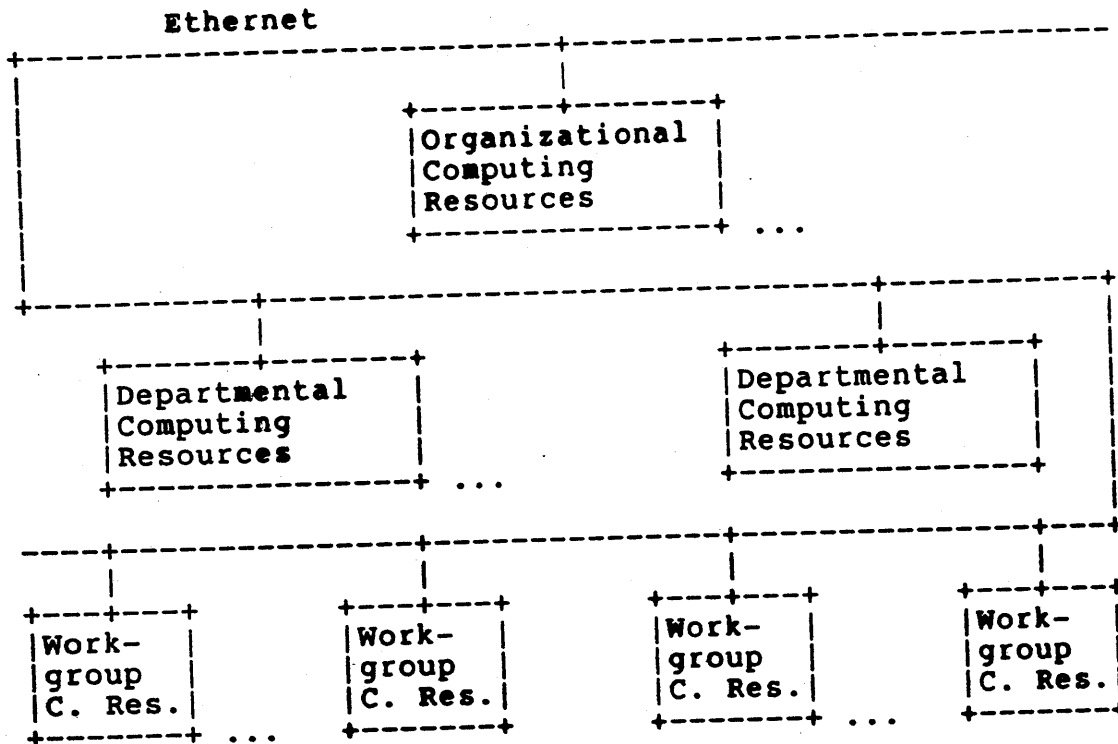


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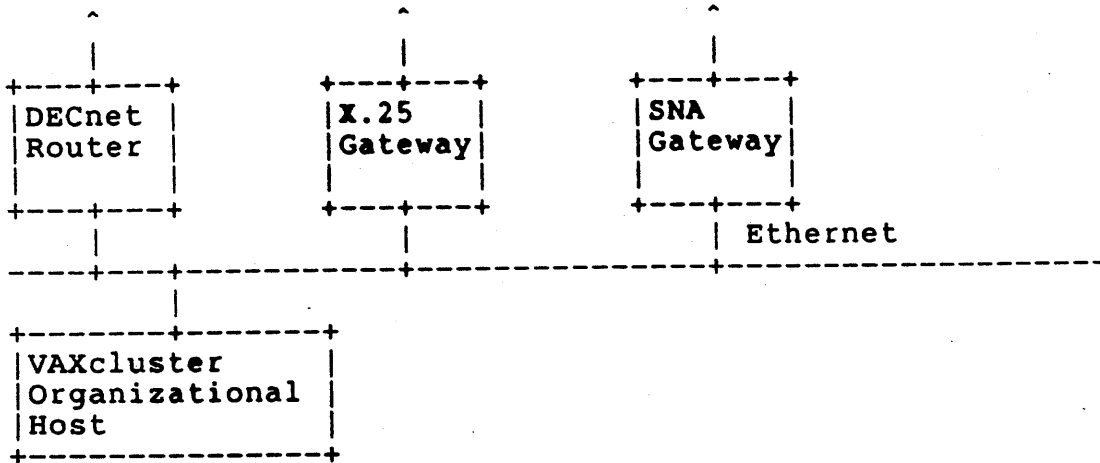
## **ORGANIZATIONAL/COMPUTING MODEL**

- o An ORGANIZATION is made up of one or more DEPARTMENTS which are made up of one or more WORKGROUPS which are made up of INDIVIDUALS (or, in some environments, laboratory equipment or machines)
- o The organization, departments, workgroups, and individuals define entities which OWN and MANAGE data and other computing resources.
- o Two important concepts mark DEC's philosophy and should be contrasted with our competitors
  1. Computing resources should be concentrated at the DEPARTMENTAL and WORKGROUP levels
  2. DEC's architecture permits any entity, when authorized, to DIRECTLY ACCESS the resources of any other entity

# COMPUTING MODEL DIAGRAM



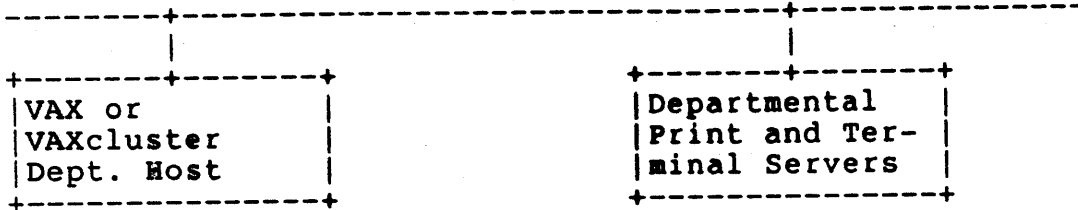
# ORGANIZATIONAL LEVEL EXPANSION



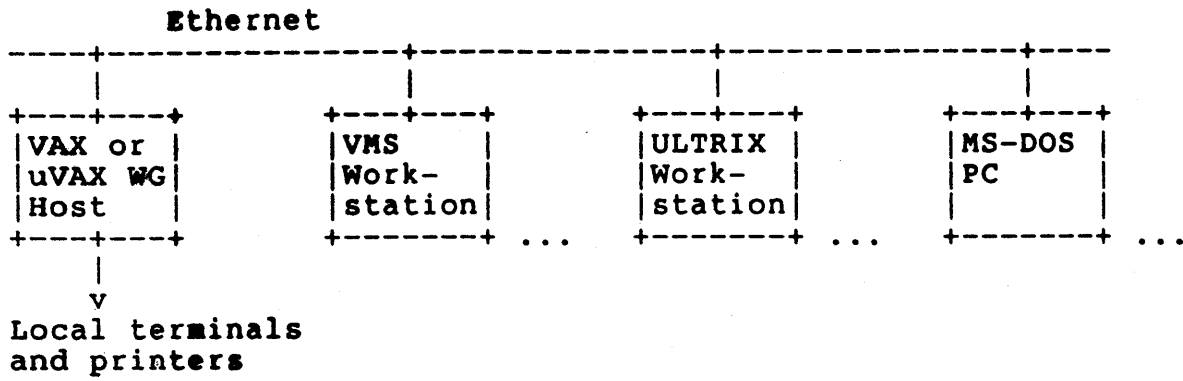


# DEPARTMENTAL LEVEL EXPANSION

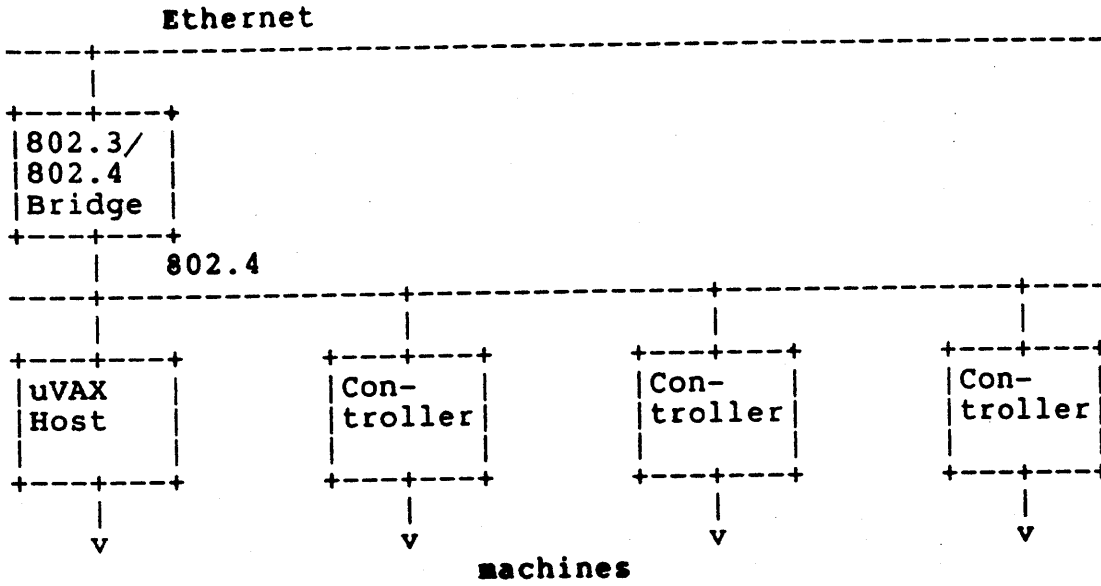
Ethernet



# WORKGROUP LEVEL EXPANSION



# SPECIAL PURPOSE WORKGROUP EXPANSION



### **3. PRODUCT STRATEGY**

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# ENGINEERING PRODUCT OUTLINE

## I. Hardware

A. Processors

B. Storage

C. Communications

D. Human Interface Devices

i. Terminal

ii. PC

iii. Workstations

iv. Printers

E. Process Interface

H. Communications Software

III. Operating Systems

IV. Data Management

V. Applications Environment

## I.A PROCESSORS

- o Base technology
- o Architecture
- o Packaging

## TECHNOLOGY MODEL

- o Invest in technology 'streams'
  - Base technology - semiconductors, interconnect, power, and cooling
  - Design tools
  - Manufacturing processes
  
- o At appropriate intervals start processor developments



## TWO TECHNOLOGY STREAMS

- o CMOS - single chip processors for lowend and midrange CPUs
- o ECL - gate arrays for highend CPUs

## ARCHITECTURE

- o Instruction set (VAX and PRISM)
- o Multiprocessing
- o Clustering

## INSTRUCTION SET

### o VAX

- Much of DEC's strength derives from having a single strategic instruction set - and we intend to continue with this philosophy
- VAX is the strategic instruction set for DEC for the indefinite future
- VAX is being extended to include vectors to increase its competitiveness in technical markets

## INSTRUCTION SET (CONT'D)

- o RISC (Reduced instruction set computer)
  - Recent research in instruction set design has suggested that better CPU performance (for a given amount of a given technology) can be obtained by radically simplifying the instruction set and shifting the burden of program interpretation to compilers
  - Commercial examples: IBM RT, HP Spectrum
  - DEC has started work on a RISC architecture: PRISM
    - \* Datatype compatible with VAX
    - \* New O/S - P/VMS - with state-of-the art internal structure and implementing VMS and ULTRIX interfaces
    - \* Common layered products with VMS
  - PRISM should be viewed as a serious experiment to determine whether the existing VMS and ULTRIX interfaces can be delivered more effectively (in several dimensions) with a different internal structure. PRISM also leads to a re-implementation of our layered s/w in a hardware independent way. PRISM should NOT be viewed as a replacement for VAX.

## MULTIPROCESSING

- o **Multiple processors**
  - **Packaged in the same cabinet**
  - **Sharing a single memory and I/O system**
  - **Under control of a single O/S**
  - **I.E. looks to a customer a 'single' high performance system**
  
- o **Permits covering a wider range of system cost and performance with fewer processor designs (and technologies)**
  
- o **In the past not pursued aggressively by DEC but now legitimized by IBM and others**
  
- o **DEC strategy: 1-4+ processors**

## CLUSTERING

- o DEC's approach to use multiple computers (not processors) sharing a mass storage subsystem to build high performance, high availability, high extensibility computing structures
- o Clusters (for some applications) effectively multiply the price and performance by 2 to 8 or more

## PACKAGING

- o Desktop

- <TEAMmate> and successors
- CMOS

- o Deskside

- uVAX2 and successors
- Qbus form factor
- CMOS

- o Midrange

- 8200/8300 and successors
- BI form factor
- CMOS

- o Highend

- 8500/8600/8700/8800 and successors
- Special form factor; BI form factor I/O
- ECL

## PROCESSORS

- o CVAX - VAX, CMOS, ~2.5 x 780
- o Rigel - VAX, CMOS, 7 x 780
- o uPRISM - PRISM, CMOS, ~15 x 780
- o Argonaut - VAX, ECL, ~15 x 780
- o Crystal - PRISM, ECL, ~30 x 780
- o Aquarius - VAX, ECL, ~30 x 780



## PACKAGES/PRODUCTS

- o Desktop - TEAMmate (CVAX, Rigel)
- o Deskside - Mayfair (CVAX, Rigel)
- o Midrange - Calypso (CVAX, Rigel, uPRISM), 1-6 processors
- o High end - Argonaut/Crystal/Aquarius, 1-4 processors

## OTHER PROCESSORS

1. Fault tolerant
2. Parallel

## FAULT TOLERANCE

- o Major business opportunities
- o Fault tolerance will become an attribute like (or part of) 'quality'
- o Clusters good start, but Clusters not a yet complete solution to many fault-tolerant applications

## ENGINEERING EFFORTS

- o Complete high availability Cluster features
- o Build small (CMOS technology) processor with hardware fault tolerance (TMR or 'pair and spare') running standard s/w
  - Cluster front end
  - Interface processor
  - Small applications processor

## PARALLEL PROCESSING

- o PPA/Andromeda canceled
- o Parallel processing is an important technology
- o Engineering efforts
  - ZODIAC - multiple uVAX/CVAX front processors to BI VAX
  - S/W A/D on PPA prototypes
  - Hardware A/D: SRC

## **I.B. MASS STORAGE STRATEGY**

- o DEC designed and manufactured storage for the full range of DEC systems**
  - Leverage technology investment**
  - Assure adequate supply**
  - Eliminate dependency on system competitors (i.e. IBM, Fujitsu)**
  
- o Fixed winchester online storage with 0.5" magtape for backup and distribution**

## STORAGE PRODUCTS (CONT'D)

o Highend

- RA82 - 600MB; RA90 - 1.2GB
- 3480
- HSC controller

## STORAGE PRODUCTS

- o Desktop - 5.25" half height
  - RF30 - 140MB
  - TF30 - 100MB
  - Integral controller
  
- o Deskside - 5.25" full height
  - RA/F70 - 270MB
  - TK/F70 - 300MB
  - KFQSI (DSSA) controller
  
- o Midrange
  - RA82 - 600MB; RA90 - 1.2GB
  - TU/A81 - 300MB
  - KSB50 (SI) controller



## I.C. COMMUNICATIONS H/W

- o Ethernet based communications environment
  - Terminal Servers
  - Print servers
  - Bridges to extend Ethernet locally
  - Routers and X.25 gateways for DECnet wide area communication
  - Wiring to desktop
  - Encryption for security
  
- o Bridges to other LAN interconnects
  - Token ring (IBM)
  - Tokenbus (MAP)
  - T1
  
- o New interconnect
  - Twisted pair Ethernet
  - XI

## XI GENESIS

- o Current CI is good for VAX 8800 Clusters
- o Large Clusters of next generation high-end machines require higher I/O bandwidth than the provided by the current CI (multiple CIs is an interim solution)
- o Need new SI for next generation (beyond RA90) disks
- o Need high bandwidth backbone for large LANs

## XI PROGRAM

- o 100 mbit/sec fiber optic FDDI
- o Active switches and parallel paths
- o Replacement for SI, CI, NI as backbone (initially)
- o Replacement for NI (eventually)

## **I.D.I.-iii.TERMINALS/PCS/WORKSTATIONS**

- o **Dumb terminals**
- o **Graphics terminals**
- o **Smart terminals**
- o **PCs**
- o **Workstations**

## LOGICAL DESIGN CENTERS

- o Dumb terminal - VT220
- o Smart/graphics terminal - above plus graphic and remote VMS (ULTRIX) windows
- o PC - above plus local PC applications
- o Workstation - above plus local VMS (ULTRIX) applications

## USAGE DESIGN CENTERS

- o
- o o Dumb terminal - lowest cost time sharing
- o o Smart/graphics terminal - enhanced human interface timesharing
- o o PC - office
- o o Workstation 1 - programmer, in house publishing, light engineering
- o o Workstation 2 - normal engineering
- o o Workstation 3 - animation, etc

## PRODUCTS

- o VT220 -> VT220EL
- o VT240 -> PANDA -> VAXmate 2 stripped/VAXterm
- o Rainbow -> VAXmate -> VAXmate 2
- o VAXstation II -> VAXstar -> VAXstar 2 (CVAX)
- o VAXstation II/GPX -> MP CVAX
- o <no current product> -> LYNX

## I.D.IV. PRINTER STRATEGY

- o Buyout strategy
- o Dot matrix/ink jet for low cost and color capability
- o Main focus: laser printers
- o Postscript imaging protocol



## PRINTER PRODUCTS

- o Dot Matrix/Ink Jet - LA75, LA250
- o Laser
  - Servers - LPS40 (40ppm), LPS20 (20ppm)
  - Serial line - LN03 enhanced (8ppm), LN04 (5-8ppm)

## I.E. PROCESS INTERFACE

- o Strategy: not chips and boards but support of Factory and Science application systems
- o Architecture: VAX real time front end
- o Implementation: Interface modules for Qbus and BI
  - VAX processor chip (uVAX --> CVAX)
  - Local memory
  - High speed parallel port
  - ELN operating system

## II. COMMUNICATIONS

- o DECNET
  - VMS
  - ULTRIX
  - MS-DOS
  
- o OSI
  
- o MAP
  
- o Gateways
  - IBM
  - X.25

### III. OPERATING SYSTEMS

- o VMS
- o MS-DOS
- o UNIX/ULTRIX
- o P/VMS

## O/S VISION

- o View VMS, ULTRIX/UNIX, and MS-DOS as INTERFACES to be delivered in proprietary, added value context
- o That added value context includes
  - WANs, LANs, Clusters - for distributed computing
  - Applications architecture - for defining the applications environment and tying applications together

## VMS STRATEGY

- o Robust, 'industrial strength' implementation
- o High availability
- o 'Production' system management
- o Programmer productivity
- o Exploitation of industry investment in personal productivity and tools
- o Ethernet VAXclusters for management of multiple lowend systems

## DATABASE BACKEND

- o Consolidate all Database work under Storage management
- o Three step program using new high performance database implementation
  - VMS
  - Server using MP GP H/W
  - Server using MP GP H/W plus accelerator

## TRANSACTION PROCESSING

- o Big market
- o Exploit DEC architecture and products



## ISSUES

- o Understanding the market
- o Identifying the market segments for DEC to target
- o Identifying the necessary engineering
- o Executing

# TECHNICAL PREREQUISITES

- o **Data integrity**
- o **Transaction integrity**
- o **I/O and database performance**
- o **System management**

## V. APPLICATIONS ENVIRONMENT ARCHITECTURE

- o A set of interfaces and facilities which sit above the traditional operating system interface but below the applications
- o Traditionally these interfaces and facilities were embedded as needed within individual applications
- o To enable applications to work together and look consistent to the user it is necessary to separate these interfaces out from the application and put them in a separate architectural layer

## NEED

- o DEC Engineering
- o S/W services
- o Customers
- o Third party software developers

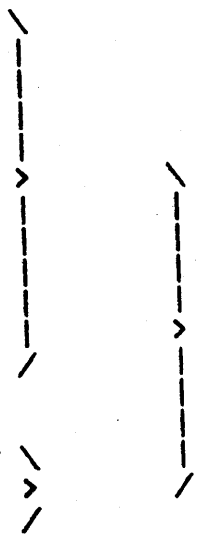
## **ELEMENTS OF APPLICATIONS ENVIRONMENT ARCHITECTURE**

- o **Windows**
- o **Compound documents**
- o **Graphics**
- o **Printing**
- o **Mail**
- o **Utilities: spreadsheets, word processors**

# VMS EXPERIENCE

Capabilities:

- SX-11A
- SX-11B
- SX-11C
- SX-11D
- SX-11M
- SX-11M+
- SX-11S
- AS
- STS
- T-11
- OS-11
- UMPS



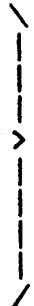
VMS

- Understood functions:
- Common Run Time Library
  - Record Management
  - Network

# APPLICATIONS ENVIRONMENT ANALOG

Capabilities:

ALL-IN-1  
A-to-Z  
BASEWAY  
IMS  
DACS  
JIS  
...



> Application environment

Understood functions:

Windows  
Compound document  
Graphics  
Printing  
Mail  
Spreadsheets  
Word processors  
...

## 4. SUMMARY

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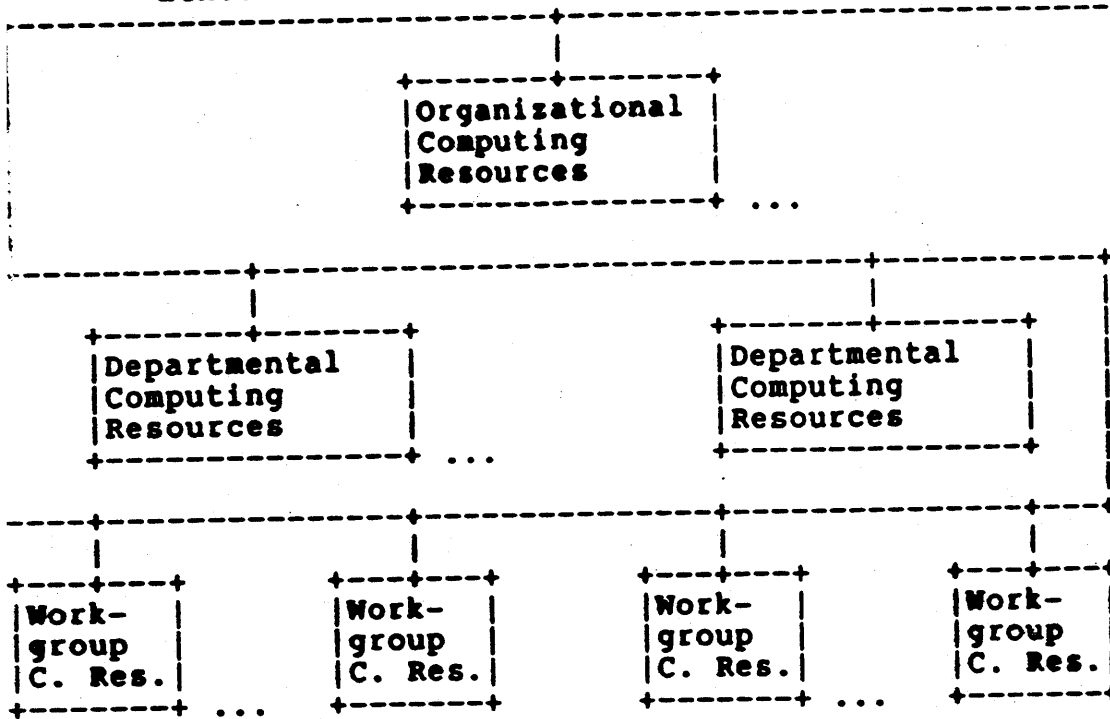


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# COMPUTING MODEL DIAGRAM

Ethernet



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