

D I S T R I B U T I O N   L I S T

Strategic Planning Committee

AGENDA & DOCUMENTS FOR MAY 13 MTG.

Paul Butterworth

Mike Dion

May 7, 1987

Eric Gnau

Chip Hay

Attached are:

Bob Healy

(1) Meeting Agenda

Bruce Linn

(2) Meeting Documents

Randy Livingston

The attached documents  
will be discussed at our  
5/13 meeting.

Peter Madams

Paul Newton

Bob Ney

Mike Seashols

Howard Shao

Chuck Walrad

Aaron Zornes

INFORMATION COPY

Gary Morgenthaler

Mike Scott

Candace Sestric

Bill Smartt

## Meeting:

Wednesday 5/13  
9:00 AM - 12:00 Noon  
Athens

## To SPC Attendees for 5/13 meeting:

Paul Butterworth  
Mike Dion  
Chip Hay  
Eric Gnau  
Bruce Linn  
Randy Livingston  
Peter Madams  
Paul Newton  
Bob Ney  
Mike Seashols  
Howard Shao  
Chuck Walrad  
Aaron Zornes  
Bob Healy

## TOPICS:

## 1. Product Plan (version 4) comments.

This document has been updated as requested at 4/1 SPC.  
Any comments on the accuracy of the changes will be considered.

## OBJECTIVE:

Approval of this revision to the overall strategy and plan.

## 2. Review of the detailed PC product plan.

An SPC subcommittee has addressed the specific needs for the PC product. Three alternative plans will be reviewed.

## OBJECTIVE:

Establish what level of support we require in the PC market.

## 3. Review of the detailed INGRES/STAR product plan.

An SPC subcommittee has addressed the specific needs for the INGRES/STAR product. Three alternative plans will be reviewed.

Also an update on the INGRES/STAR gateway contracts either completed or currently being negotiated.

## OBJECTIVE:

Establish what level of support we require in the DDB market.

Update on gateway progress.

## 4. Review of the potential SUN/RT joint development plan for Sun Simplify2.

Sun is interested in a joint development effort for simplify2. Simplify is an interactive, window-based browser for a relational database. The goal of this venture is to have sun run simplify on ingres and have RT use simplify as our end user query reporting

tool both on the sun and other window supporting hardware.

**OBJECTIVE:**

Update on how we will integrate Simplify2 into our product strategy.

5. Review of potential technology acquisitions or licensing options for CASE tools.

We have been investigating CASE tools for integration with INGRES. Although this effort is in its preliminary stages, we need to determine at a high level

whether we need such a tool.  
high level functions it must support.  
environments in which we MUST run (there is no tool  
that runs in all our supported environments).

Will also review initial investigations into the DEFT product.

**OBJECTIVE:**

Decide if we want to complete a licensing/acquisition in this area.

Decide if we want to continue looking at the DEFT product.

6. Meeting schedule for remainder of 1987.

June 2 (note: changed from June 3),  
July 1,  
August 5,  
September 2,  
October 7,  
November 4,  
December 2

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**INGRES for PCs  
Product Strategy and Plan**

INGRES for PCs Planning Committee  
Relational Technology Inc.

April, 1987

Revision Level : 1

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# CHAPTER I

## Committee Organization

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### 1.1. Introduction

The INGRES for PCs planning committee was established by the SPC to develop detailed INGRES for PCs product strategies and plans within the context of the overall INGRES strategy and plan developed by the SPC.

The members of the committee are:

- Paul Butterworth
- Bruce Linn
- Bob Kooi
- John Newton
- Howard Shao
- Steve Vandor
- Chuck Walrad
- Steven Weiss

This is a report on the initial planning completed by this committee at meetings on April 9 and 13, 1987.

### 1.2. Objectives

The committee objective, as specified by the SPC, is to develop the product strategy and plan for the INGRES for PCs product for the next 18 months.

Since there is no stated resource allocation for INGRES for PCs, the committee agreed to develop three overall plans corresponding to three product strategies. The three plans are labeled "conservative", "moderate" and "aggressive" representing both the level of exploitation of the PC environment and the resources required to implement each plan. Note that only the conservative plan can be implemented with current resources.

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## CHAPTER II

### INGRES for PCs Strategies

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#### 2.1. User Benefits

The committee enumerated three potential user benefits that can be derived from the INGRES for PCs product. These benefits can also be considered as representing the potential markets we are trying to satisfy with the product. Developing the proper "product" (not just software) to realize these potential benefits is the goal of INGRES for PCs. Note that throughout this document "product" refers to the collection of software, support, documentation, marketing and sales required to build a successful product. The software only portion of the product will be referred to as the product's "functionality". The benefits (markets) are described below:

- *Access Point to Corporate Computing*

The PC is the medium through which users will increasingly gain access to corporate computing and information resources. Our ability to connect the PC user to a wide range of corporate data through the Workstation product is a major benefit to users and well integrated with our overall distributed database positioning.

- *Mainframe DBMS Power on the PC*

INGRES for PCs offers the performance, functionality and flexibility of a mainframe DBMS running on the PC. This affords the user the opportunity to build more functional applications in the PC environment. This is increasingly important as more and more of the corporate computing load is shifted to the PC environment.

- *Mainframe Application Development on the PC*

INGRES for PCs offers powerful, mainframe application development facilities on the PC and portability of applications between PCs and corporate minis and mainframes. Thus, the PC can be considered a cost effective development vehicle for mainframe applications or a cost effective deployment vehicle for applications developed on a mainframe. It is interesting to note that there are organizations committed to both of these strategies.

#### 2.2. Environmental Considerations

The PC environment is rather unique in that it is about to divide into two separate environments.

- *640K MS-DOS*

The standard PC technology until recently has been the 8086/80286 PC compatible with a maximum usable address space of 640KB. This market represents an installed base of upwards of 10 million machines. Although attractive as a large market, it represents a severe technical constraint for supporting the target markets described above. The users are pressing for ever improved functionality and ease-of-use which translate into programs

which cannot fit in the 640K address space. The standard setters in this marketplace have recently declared this technology obsolete by introducing OS/2 as the strategic operating system for future generations of products.

- *OS/2 and XENIX*

As mentioned above, both hardware and software advances are making it impossible to stick with the 640K MS-DOS environment. The next generation of systems will be based on 80286/80386 hardware with large address spaces. This will be supported by both OS/2 (Microsoft/IBM standard) and XENIX (Microsoft/AT&T standard). This generation of products provides powerful enough platforms to truly run mainframe software products on the PC. Also note that for all intents and purposes, these platforms will be essentially indistinguishable from the low end workstation offerings from DEC, SUN, APOLLO and IBM (RT PC).

An important strategic decision for Relational Technology is how to support these two environments. The recommendation of the PC planning committee is to provide some support for both environments as follows:

- *MS-DOS*

Continue to offer INGRES for PCs R5.0 as the stand-alone database for this environment. Our newer technology will not fit in this environment and we believe users for whom additional stand-alone capability is required will have no problem moving to the larger address space platforms.

Upgrade the 640K workstation product to allow connectability into our R6.0 and following systems. This will allow continued access to corporate computing resources from all of a corporation's PCs.

- *OS/2 and XENIX*

Focus on this as the emerging base for our next generation products. In this environment we believe we can run our 6.0 and following DBMS technology (although the 80286 will give us some problems) and that these machines are an appropriate base for advanced, window-based user interfaces. New generations of our software technology will not be targeted to run on 640K machines.

### **2.3. Issues**

Given this universe of potential uses and environments for INGRES for PCs there are a set of interlocking decisions we must make.

Which of these potential "markets" do we wish to cultivate? Which ones are we most likely to be successful in?

What level of investment are we willing to make in the products? In other words how rapidly do we wish to enter each of the markets?

Assuming we don't have the resources to enter all markets immediately, what is the relative emphasis we should place on each market?

Do we have a rational and cost effective strategy for dealing with the two environments?

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## CHAPTER III

### INGRES for PCs Product Plans

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This section describes three plans for the development of the INGRES for PCs product over the next eighteen months. The plan discusses only the functionality being offered to the user but assumes that an appropriate level of support in marketing, technical support, sales and engineering will be required to make the functionality an attractive product. Each plan is presented with the following information.

- *Target Market*

Describes the market or markets that the plan supports. These markets are derived from those described in the INGRES/STAR strategy chapter.

- *Competitive Position*

This is an estimate of our position relative to our major competitors in eighteen months if we implement the plan. This is based on whatever information we have about competitors development plans and our own educated guesses as to what they are likely to do.

- *Revenue Impact*

A very rough guess as to the impact of implementing the plan on our revenue projections. This is strictly an intuitive estimate and is presented as a qualitative estimate.

- *Functionality*

The functionality to be provided to the users if the plan is implemented.

- *Summary*

A short summary of the plan (for completeness).

### 3.1. Conservative Plan

#### 3.1.1. Target Market

Enhances our ability to access corporate computing resources from the PC. It also provides us with another platform for corporate data in the form of a LAN database server with distributed capabilities to integrate this data with other corporate data. This is a logical extension of our distributed database and connectivity position.

#### 3.1.2. Competitive Position

This plan provides us with a competitive network, distributed and LAN position. We believe our major competitors will match this capability in the timeframe given. It will continue to leave us in a poor position with respect to workstation user interfaces - a major factor in this market. It also leaves us with a relatively weak migration path to our new technology since the



PC product will not be able to communicate with any of our 6.0 based environments.

### **3.1.3. Revenue**

This plan should support our current revenue targets for the next year but is likely to leave us in a very weak position and unable to support the plan for the following year.

### **3.1.4. Functionality**

The conservative plan will provide the following additional functionality to our users.

- DECNET-DOS protocol support R5.0
- NETBIOS protocol support R5.0
- PC COAX protocol support R5.0
- 386 XENIX (R5.0, I/STAR R5.0)

### **3.1.5. Summary**

This plan will support our short term goals but does not provide a strong enough base on which to continue to build competitive products for the future. It will leave us trailing our direct competitors in eighteen months.

## **3.2. Moderate Plan**

### **3.2.1. Target Market**

This plan supports the connectability and distributed market quite effectively with a good story for those users migrating to 6.0. It also provides us with a more competitive product for the PC DBMS and application development markets.

### **3.2.2. Competitive Position**

This will provide us with a strong connectability and distributed product offering easily matching our direct competition. It will provide us with reasonable user interfaces to support the PC user although this will only offset strengths already realized by our competitors. It will leave us weak in OS/2 support which will be important to corporate MIS but we can likely offset this with a strong commitment to a product offering in 24 to 30 months. We also will have no window support leaving us vulnerable to an aggressive move by our competitors.

### **3.2.3. Revenue**

This plan will support our current revenue plans.

### **3.2.4. Functionality**

Includes all the functionality of the conservative plan and the following additions:

- 5.0 Interfaces to 6.0 DBMS connectivity
- ESQL/COBOL
- Transactions R5.0
- PC oriented user tools
- PC data transport (Dbase III interface)
- Limited STAR R5.0 support for PC
- INGRES/NET for 286XENIX

### **3.2.5.**

#### **Summary**

The moderate plan will provide us with a competitive product in most areas and a strong position in the connectivity market. It leaves us vulnerable to aggressive moves by our competitors to support windows and OS/2.

### **3.3. Aggressive Plan**

#### **3.3.1. Target Market**

Strong offering for all three identified markets - connectivity, stand-alone dbms and development/deployment workstations. We will be offering a complete set of strategic PC DBMS solutions to the corporation.

#### **3.3.2. Competitive Position**

INGRES for PCs will have a stronger overall story than any of our competitors. A very attractive PC, LAN and DDB position with support for the strategic corporate PC standards (OS/2, SAA and WINDOWS).

#### **3.3.3. Revenue**

This product will significantly enhance our overall revenue.

#### **3.3.4. Functionality**

Includes all the functionality of the conservative and moderate plans with the following additional capabilities.

- R6.0 applications compatibility on MS-DOS.
- Window based tools.
- ESQL/ADA
- ESQL/FORTRAN
- Fit into SAA (FE's on SQL/SNA in OS/2).
- 386XENIX (R6.0, STAR 6.0)
- OS/2 (R6.0, STAR 6.0)

### **3.3.5.**

#### **Summary**

Relational Technology provides the strategic PC DBMS solution.

### **3.4. Competitive Summary**

The following table summarizes the committee's best guess as to our competitive position under each of the plans. This is presented as a list of desirable features of the system along with an indication of whether we would win (W), draw(D) or lose(L) in a head to head competition with the indicated product. There are three entries representing from left to right the conservative, moderate and aggressive plans.

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Competitive Analysis Matrix						
Feature	Informix	Oracle	Msoft	A-T	IBI/CUL	Lotus
User Interfaces	L D W	L D D	L L L	D W W	L D W	L L L
Application Tools	W W W	W D D	W W W	W W W	D D D	W W W
DDB	W W W	D W W	W W W	W W W	W W W	W W W
Networking	D D D	D D D	W W W	D D D	D D D	W W W
OS/2	L L S	L L D	L L D	L L D	L L D	L L D
XENIX	L D W	W W W	W W W	W W W	W W W	W W W
SAA	D D W	L L D	D D W	L L D	L L D	L L D
640K	D L L	W W W	W W W	D D D	???	???
Multi-user	D D D	D D D	D D D	W W W	D D D	W W W

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## CHAPTER IV

### Summary

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This report describes three possible plans for the development of INGRES for PCs products characterized by their benefits to Relational Technology and the level of investment required to realize those benefits. It is intended that this information be used by the SPC to determine what strategy and level of investment is appropriate for INGRES for PCs in relation to the other products of Relational Technology.

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**INGRES/STAR**  
**Product Strategy and Plan**

INGRES/STAR Planning Committee  
Relational Technology Inc.

May, 1987

Revision Level : ~~2~~ 2

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# CHAPTER I

## Committee Organization

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### 1.1. Introduction

The INGRES/STAR planning committee was established by the SPC to develop detailed INGRES/STAR product strategies and plans within the context of the overall INGRES strategy and plan developed by the SPC.

The members of the committee are:

Paul Butterworth  
Mark Hanner  
Bruce Linn  
Corcky McCord  
Bob Ney  
Kee Ong  
Howard Shao  
Christy Weiser

This is a report on the initial planning completed by this committee at a meeting on April 8, 1987.

### 1.2. Objectives

The committee objective, as specified by the SPC, is to develop the product plan and strategy for the INGRES/STAR product for the next 18 months.

Since there is no stated resource allocation specifically for INGRES/STAR, the committee agreed to develop three overall plans corresponding to three product strategies. The three plans are labeled "conservative", "moderate" and "aggressive" representing both the level of exploitation of the INGRES/STAR product and the resources required to implement each plan. Note that even the conservative plan requires more resources than are currently allocated to INGRES/STAR in development, support organizations and marketing.

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## CHAPTER II

### INGRES/STAR Strategies

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#### 2.1. User Benefits

The committee agreed there are four classes of user benefits that can be derived from the INGRES/STAR product and exploited by Relational Technology. Developing the proper "product" (not just software) to realize these potential benefits is the goal of INGRES/STAR. These benefits are described below:

- *Homogeneous Access to Heterogeneous Databases*

This is a rather technical name for an obvious user benefit. By developing the gateway technology we have defined for INGRES/STAR we can exploit INGRES/STAR even in homogeneous, single machine environments. This technology will allow us to produce products that offer the user an easy migration path from his current database technology to relational (INGRES) databases. This technology will also allow us to produce products that offer the user the ability to write applications which run transparently against all databases supported via the gateway technology (whether they are relational or not) and the potential to access several different kinds of databases within a single application using a single interface.

- *Performance*

The INGRES/STAR technology can be exploited to offer higher throughput solutions by allowing the user to apply multiple computer systems to his database problem. This remains an attractive product even in a homogeneous environment. Since performance is still the number one issue in dbms evaluation, this will provide significant benefits to Relational Technology.

- *High Availability*

The INGRES/STAR technology can be exploited to produce products offering the user cost effective, high availability solutions. This is also an attractive product even in a homogeneous environment.

- *New Functionality*

This is a miscellaneous category for many of the benefits traditionally associated with a heterogeneous distributed database. These include transparent access to remote db's, multiple remote db's and support for centralized control of a collection of remote db's. These benefits are only available to users running in a distributed (and possibly heterogeneous) environment.

Given this universe of potential uses for our INGRES/STAR technology there are a set of interlocking decisions we must make.

Which of these potential "markets" do we wish to cultivate?

What level of investment are we willing to make in the products? In other words how rapidly do we wish to enter each of the markets?

Assuming we don't have the resources to enter all markets immediately, what is the relative emphasis we should place on each market?

The INGRES/STAR planning committee cannot make such recommendations until the available resources have been established. This report provides the necessary information for the SPC to evaluate the benefits to Relational Technology derived from three different levels of investment. The SPC can use this information to determine the strategy and level of investment for the INGRES/STAR product.



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## CHAPTER III

### INGRES/STAR Product Plans

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This section describes three possible plans for the development of the INGRES/STAR product over the next eighteen months. The plan only discusses the functionality being offered to the user but assumes that an appropriate level of support in marketing, technical support, sales and engineering will be required to make the functionality an attractive product. Each plan is presented with the following information.

- *Target Market*

Describes the market or markets that the plan supports. These markets are derived from those described in the INGRES/STAR strategy chapter.

- *Competitive Position*

This is an estimate of our position relative to our major competitors in eighteen months if we implement the plan. This is based on whatever information we have about competitors development plans and our own educated guesses as to what they are likely to do.

- *Revenue Impact*

A very rough guess as to the impact of implementing the plan on our revenue projections. This is strictly an intuitive estimate and is presented as a simple qualitative judgement.

- *Functionality*

The functionality to be provided to the users if the plan is implemented.

- *Summary*

A short summary of the plan (for completeness).

### 3.1. Conservative Plan

#### 3.1.1. Target Market

This plan enhances INGRES/STAR capabilities for current users by providing some increased functionality.

#### 3.1.2. Competitive Position

This will establish RT as a true DDB vendor but will not give us a significant advantage over our competitors. We will likely be at a disadvantage in the area of support for heterogeneous environments.

### **3.1.3. revenue**

This plan will support our conservative revenue targets.

### **3.1.4. Functionality**

The conservative plan will provide the following additional functionality to our users.

- Support for full query language
- Support for Jupiter and native SQL frontends
- Full Transactions

### **3.1.5. Summary**

The conservative plan does not exploit the technology base or our current lead in the market. It does not allow us to open new markets for INGRES/STAR.

## **3.2. Moderate Plan**

### **3.2.1. Target Market**

This plan supports our entry into the Heterogeneous access market. This includes users with problems migrating from old dbms technology to relational and those with heterogeneous environments (specifically VAX and IBM).

### **3.2.2. Competitive Position**

Proper exploitation of this plan will make us the market leader in heterogeneous systems. We do not believe our major competitors will provide this level of functionality in this timeframe.

### **3.2.3. Revenue**

This will enable significantly more INGRES sales and open a new market segment for INGRES/STAR.

### **3.2.4. Functionality**

Includes all the functionality of the conservative plan and the following additions:

- DXT Gateway
- Gateway Toolkit
- Native DB2 gateway
- PC INGRES/STAR (386)
- RMS gateway
- Rdb gateway
- INGRES/STAR administration tools

### **3.2.5. Summary**

This plan exploits our current INGRES/STAR technology base and our portability to be the clear leader in heterogeneous DDB. We believe this is the largest immediate market for the INGRES/STAR technology.

## **3.3. Aggressive Plan**

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### **3.3.1. Target Market**

Support for the heterogeneous market, the high performance market and, to a lesser degree, the high availability market.

### **3.3.2. Competitive Position**

This plan would establish us as the vendor of the only complete DDB solution. We believe no competitor will be able to match the complete solution offered by this plan and will establish us as the outright leader in DDB technology.

### **3.3.3. Revenue**

This level of functionality should be extremely attractive to the fortune 100 and our leadership position should contribute to significantly higher revenues.

### **3.3.4. Enhancements**

Includes all the functionality of the conservative and moderate plans and the following additional capabilities:

- Deferred Copies
- Fragments
- Performance Improvements
- Central Control of a DDB
- Oracle gateway

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## CHAPTER IV

### Summary

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This report describes three possible routes through which to exploit INGRES/STAR characterized by their benefits to Relational Technology and the level of investment required to realize those benefits. It is intended that this information be used by the SPC to determine what strategy and level of investment is appropriate for INGRES/STAR in relation to the other products of Relational Technology.

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**INGRES**  
**Product Strategy and Plan**

Relational Technology Inc.

April, 1987

Revision Level : 4

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## CHANGE SUMMARY FOR VERSION 3

Version 3 of the Product Strategy and Plan contains the following changes:

### INGRES Product Plan

1. The timeframe has been stretched to September, 1988. Since this will be approximately one year after 6.0 release. This is the rough timeframe for completing development of the next version.
2. The resource allocation diagrams have been annotated with estimated development costs for each enhancement.
3. A set of enhancements has been proposed in the resource allocation section.

No other changes have been made to the document.

## CHANGE SUMMARY FOR VERSION 4

### INGRES Product Strategy

1. Added X/OPEN and RDA to the Industry standards.
2. Added RDA and transport as the specific OSI protocols we need to support.
3. Removed AOS/VS from the strategic environments and added POSIX as the specific UNIX V standard we will support.
4. Changed Burroughs/Sperry to Unisys and added Japanese vendors to the list of strategic vendor relationships.
5. Changed Quality to RAS in the INGRES key dimensions. This is a more precise description of what we are trying to provide.
6. Added RAS to INGRES RDBMS directions.
7. Updated windowing environments to include X-windows on VMS.

### INGRES Product Plan (Resource Diagrams)

1. Included cost of complex data objects in the cost of the end user query/reporting tools since it is a requirement for building this tool.
2. Moved end user ABF down in priority and below the critical line at the direction of the SPC.
3. Changed EQUOL to EQUOL/ESQL for completeness.
4. Added an entry for the additional functionality required by the GMR project for I/STAR. This includes parallel processing of local queries, SQL DB's as coordinators and DDB's as LDB's within a distributed database.
5. Moved INGRES/NET toolkit up in priority to the first item below the critical list.

No other changes were made to the document.

Table of Contents

Introduction

INGRES Product Strategy (1987 - 1990)

    Strategy Summary  
    Strategy Presentation

INGRES Product Status

    Application Portability  
    Supported Environments  
    Standards Conformance  
    Distributed DBMS  
    Application Development Tools  
    End User Tools  
    DEMS  
    Performance  
    Quality

INGRES Product Plan (to June 1988)

    Summary  
    Capabilities  
        Connectivity  
        Functionality  
    Enhancement Priorities and Resource Allocations  
    Enhancement Descriptions  
    Availability Matrix

INGRES Product Plan Management



The INGRES product strategy and plan consists of three major sections.

#### PRODUCT STRATEGY

An overview of the INGRES product as it will evolve over the next three years. The strategy defines the key environments and capabilities of the system required to improve the competitive position of the INGRES product. This section presents a snapshot of the system as it will look in 1990.

#### PRODUCT STATUS

A very brief summary of the current competitive status of the product assuming all current development projects are completed. A short summary is presented for each of the nine key product areas defined in the product strategy.

- Application Portability
- Environments
- Standardization
- Distributed DBMS
- Application Development
- End User Tools
- DBMS
- Performance
- Quality

#### PRODUCT PLAN

The product plan for enhancements to INGRES over the next eighteen months (through FY88). At this time, only the high level sections of the plan are complete. These sections describe the connectivity and functionality we will complete, the priority of each of these enhancements and the resources allocated to each product area. This section is organized around logical products rather than the product attributes described in the product strategy to make the plan easier to understand.

Accurate development plans for these enhancements are not available at this time. Our current goal is to prioritize potential enhancements both by prioritization within a logical product and by the relative resource allocations. Detailed planning will be completed in a second iteration once the macro level planning is complete.

INGRES PRODUCT STRATEGY

Leadership in the Distributed relational database tools market.

The strategy to achieve this is to provide the best package of tools supporting the following functionality:

Application Portability

Operates in popular environments (OS and hardware)

Conforms to industry standards

Distributed DBMS

Application Development Tools

End User Tools

Relational DBMS

High Performance

Quality

Relevant portions of the product strategy as approved by the SPC are presented on the following slides.

**Product Strategy Statement**

**Relational Technology**

**Strategic Planning Committee**

**November 1986**

**Company Confidential**

Last Revision: April 1987

## PRODUCT FOCUS

RELATIONAL TECHNOLOGY is focusing its product development efforts to succeed in the DB2-compatible SQL DBMS market.

This requires commitment to:

- o INGRES is INGRES is INGRES
- o strategic operating environments
- o compatibility with RDBMS and de facto industry standards
- o differentiation along key dimensions

## RDBMS AND INDUSTRY STANDARDS

### User standards

- o Consistent, standard interface across PCs, minis, and mainframes with human engineering specific to each computer environment:

- 3270 pf key support in IBM mainframe environments
- PC-style ring menus and function key mapping in PC environments
- de facto environment-specific windowing facilities

- MS-windows
  - X-windows

- o Other standards we must prepare to support:

- GKS -- graphics standards

- Postscript/Xerox PDL -- page description languages

- DCA/X.400 -- document transmission standards

- NFS -- network file systems

## RDBMS AND INDUSTRY STANDARDS

Relational Technology is committed to these RDBMS and de facto software industry standards:

### SQL (including precompiler) compatibility

- o DB2 compatible
- o ANSI level 2 compliant
- o X/OPEN compliance

### NETWORKING

- o SNA LU6.2 (also known as APPC)
- o MAP/TOP
- o OSI protocols (RDA and OSI transport)

## STRATEGIC ENVIRONMENTS

Relational Technology recognizes these environments as strategic in the DB2-compatible SQL market:

- o MS-DOS
- o MVS
- o UNIX System V / POSIX
- o VMS
- o VM/CMS

## STRATEGIC VENDOR RELATIONSHIPS

Vendor relationships with the following industry leaders are seen as necessary to support Relational Technology's strategic goals, either because of the hardware market share they command or because of the distribution channels they provide.

- o AT&T
- o Unisys
- o DEC
- o Data General
- o HP
- o IBM
- o ICL and other key European vendors  
such as Bull, Nixdorf, Olivetti and Siemens
- o Key Japanese vendors

Other possible vendor relationships are seen as opportunities, not key to achieving corporate strategic goals.



## KEY DIMENSIONS

RELATIONAL TECHNOLOGY will be the industry leader and clearly superior to its competitors in key dimensions.

RELATIONAL TECHNOLOGY will differentiate its products from competitors along these dimensions:

- o Distributed DB2-compatible Database Capability
- o Application Development Productivity
- o End User Decision Support Facilities
- o Performance
- o Reliability, Availability, Supportability and Support Services.

## INGRES Directions

- o Current plans for 1987 to 1990 timeframe.
- o Consistent with our overall positioning.
- o Next generation RDBMS.

## INGRES Directions

- o Distributed Access
- o High Performance RDBMS
- o Powerful, easy to use tools
  - Object-oriented development environment
  - Workstation-oriented user interface
- o Advanced DBMS functionality

## INGRES/STAR Directions

- o Gateways (open architecture)
- o Copies
  - deferred
  - synchronous
- o Fragments
- o Improved performance
  - Optimization
  - Parallel algorithms
- o Fail-soft capability for continuous operation
- o Distributed database administration tools

## INGRES/NET Directions

- o Extended capabilities

- INGRES/STAR protocol enhancements
- Gateway enhancements

- o Protocols

- SNA LU 0
- SNA LU 6.2 (APPC)
- MAP
- OSI

## INGRES RDBMS Directions

- o SQL standards conformance
  - Referential integrity
  - Outerjoin
- o Improved performance
  - Optimization algorithms
  - Transaction processing improvements
  - support for large machines (above 10 MIPS) and workstations
- o Advanced DBMS functionality
  - Datatypes
  - Database procedures
  - Rules as data
- o Reliability, Availability, Supportability

## INGRES User Interface Directions

### Extended Tool Functionality

- o Integrate forms, graphs and reports
- o Extend form and field types
  - Cross tabulation fields
  - Spreadsheet fields
  - Graph fields
- o Windowing for simultaneous form display
- o Sophisticated object composition
- o Integrate user applications into RT environment

## INGRES User Interface Directions

### Object-oriented development environment

#### o Object OSL

- Procedures (frames, operations)
- Data (tables, queries, joindefs)
- Display (forms, graphs, reports)
- Windowing and bitmap extensions
- User defined frame types

#### o Enhanced development environment

- Interactive debugger
- Source control
- Concurrent development
- Full dictionary access



## INGRES User Interface Directions

### Workstation-oriented user interface

- o Workstations - PC/AT (minimum), VAXstation, SUN
- o Selection by pointing
- o Interactive dictionary access for easy selection
- o Visual Programming extensions
  - Specification by graphical composition
  - WYSIWIG confirmation
- o High resolution display support
- o Windowing support
  - UNIX: X-windows
  - MSDOS: MS windows
  - VMS: X-windows

## INGRES User Interface Directions

### Additional User Interface Tools

- o Design tools
  - Database design
  - Application design
- o DBA tools
  - Data administration
  - Tuning
- o Decision support tools
  - Browser
  - Data analysis
  - Statistics
  - Report preparation

## INGRES in 1990

- o Distributed Databases in Heterogeneous Environments
- o High performance
- o Extended DBMS to represent more data semantics
- o Object-oriented development environment
- o Workstations as the preferred user interface

This is a summary of the current competitive status of the INGRES product. It is essentially a synthesis of the input from sales, marketing and user evaluations of the INGRES product and its strength relative to our primary competitors.

#### APPLICATION PORTABILITY

Application Portability is the ability to run INGRES applications in all environments in which the product is supported. Applications in this context includes anything you can run more than once and, to a lesser degree, whether the interactive environment is the same.

INGRES is very competitive in this area. Applications are portable across all our environments with little or no changes. We are a little weak on the PC where we have subsetted functionality in the interest of better performance (transactions, some FE features, RBF). All of the PC related problems should be solved by more powerful PC hardware.

ISSUE: do we need to do anything besides wait for better hardware?

#### SUPPORTED ENVIRONMENTS

Hardware and software systems on which INGRES is available. Gateways are evaluated in a separate section.

INGRES is competitive in this area by running on this most popular systems (VMS, UNIX, VM, PC - 3Q87, MVS - 2Q88, DG/AOS - 7Q88). All of our competitors are struggling as we are to complete products for all these environments. Oracle and INFORMIX are generally acknowledged to support more environments although ORACLE has been unable to complete MVS and INFORMIX still has to complete VMS, MVS and VM.

ISSUE: Do we need more environments to remain competitive in our standard license business? If so, which ones?

ISSUE: For OEM sales we could make significant progress by selling Tools and STAR only. This would be a way for vendors not running full INGRES to get connected to DEC and IBM databases (every other vendor would love to do this). Targets would be DG(it already worked), HP, PRIME, UNISYS, NCR.

#### STANDARDS CONFORMANCE

SQL Competitive as of Release 6.  
We are essentially there with 6.0. A few features need to be added for complete standards conformance but we are in a better position than everyone but IBM and Oracle.

NET Very competitive with market leading functionality.  
We already support popular networks  
DECNET  
TCP/IP  
ASYNCH  
LUO

Only competitive weakness is Coax and DECNET for the PC product and propagating our protocol support to more environments. However, this isn't really a weakness relative to our competitors offerings.

UI's Very Competitive. Support GKS and local conventions in each environment.

**ISSUE:** Supporting emerging window standards for X and, possibly, Microsoft windows.

#### **DISTRIBUTED DBMS**

Functionality and gateways to allow other DBMS's to participate in a distributed database.

Very competitive. Providing industry leading functionality and the only publicly demonstrated gateway capability (at least among commercial vendors).

**ISSUE:** This capability is the hub around which we build our entire strategy. We must maintain industry leading functionality in this area.

#### **APPLICATION TOOLS**

Tools for building applications. Generally thought of as tools for "professional" application developers although such users may not be computer scientists, their primary (and usually only) job is building applications.

Very competitive. Generally perceived as providing the best set of tools in our market. This does not mean that we don't have weaknesses in specific areas relative to our competitors but we do have the best overall solution.

**ISSUE:** To retain our industry leading position we must address:

- Data Dictionary
- Design Tools
- Windows and advanced display functionality

**ISSUE:** We must move to an SQL base to support the rest of our product strategy.

#### **END USER TOOLS**

Tools for end user query, reporting and application building. These are users whose primary job is not working with Ingres.

Not competitive. INGRES is currently perceived as being behind in this area of the technology for two reasons:

- No integrated query and reporting tool
- Minimal "windowing" capabilities

**ISSUE:** We need to bring products in this area up to the minimal acceptable standards for the market.

#### **RELATIONAL DBMS**

The underlying database manager (everyone knows what this is).

Competitive but its touch and go. General perception is that we are slightly inferior to Oracle in this area primarily because of missing functionality and SQL. Since this is the easiest portion of the system to evaluate we need to demonstrate "technological leadership" in this area as well as INGRES/STAR.

**ISSUE:** Advanced features to give us a strong position are

- Integrity support
- High availability operation

## Abstract datatypes

### PERFORMANCE

How fast everything goes.

Very competitive. We are arguably the leader here (nobody really knows) and simply need to maintain our current position.

ISSUE: Competitive performance will require

100 transactions/second by 1988

250 transactions/second by 1989

ISSUE: Performance is not yet an issue for tools. Will this remain true?

ISSUE: Performance is not yet an issue for INGRES/STAR since there are no competitive products. We should remember though that improved performance significantly expands the available market for any database product. Should we wait to be pressed by competitors or should we make a significant investment early to establish a larger market and create barriers for our competitors?

### QUALITY

Quality of our product as perceived by customers. This actually involves perceptions of the product itself, support, documentation, training, marketing, sales and administration. Only the product will be addressed here.

Very competitive but in a precarious position. We are as good or better than our direct competitors but will soon be going up against products which have had large investments in reliability (DB2). Also, it is not clear that any of the products are of high enough quality to satisfy our most important customers. Jupiter should provide a significant improvement in overall quality.

ISSUE: We need to keep a watchful eye on trends in this area. If our product loses its edge, it is a very long process to make significant improvements.

This section presents a summary of the product plan through FY88. The first section describes the capabilities made available during this timeframe in terms of connectivity and functionality. Connectivity is described by presenting diagrams of the connections available every six months, diagrams of "typical" marketing packages and a connectivity matrix for the entire product line. Functionality available is summarized for each release made available during this period.

The relative priority of each element of the connectivity and functionality plans is prioritized by presenting the overall resource allocations for each area of product development and a priority ordered list of enhancements within each product area. This is the most important part of the plan since it describes how tradeoffs will be made when they are required.

### CONNECTIVITY

The connectivity diagrams illustrate the connectivity available between our most popular direct ship environments. Each box represents a generic set of INGRES capabilities (ingres only, ingres and ingres/net, ingres, ingres/net and ingres/star), the operating systems on which those capabilities are available, and the net protocols with which they can be interconnected with other generic INGRES capabilities. Note that each product is labeled with the release level we will be supplying for that set of environments. Note that not all the protocols on a particular arc are available between all the environments listed. The labels on the arcs describe the sum of all protocols supported between those two generic classes of services (eg, coax is not available to VMS on the 4Q88 diagram).

The connectivity diagrams are followed by three "typical" configurations. These represent a generic manufacturing environment, a generic DP environment (both DEC and IBM variants) and a generic OEM environment. These diagrams illustrate particular suites of products we will be able to sell by the beginning of FY88.

The connectivity matrix shows the specific connections allowed between INGRES products running in each environment and their availability dates. Note that none of the dates are committed and some entries do not have dates since we don't have even a rough idea of when they will be available.

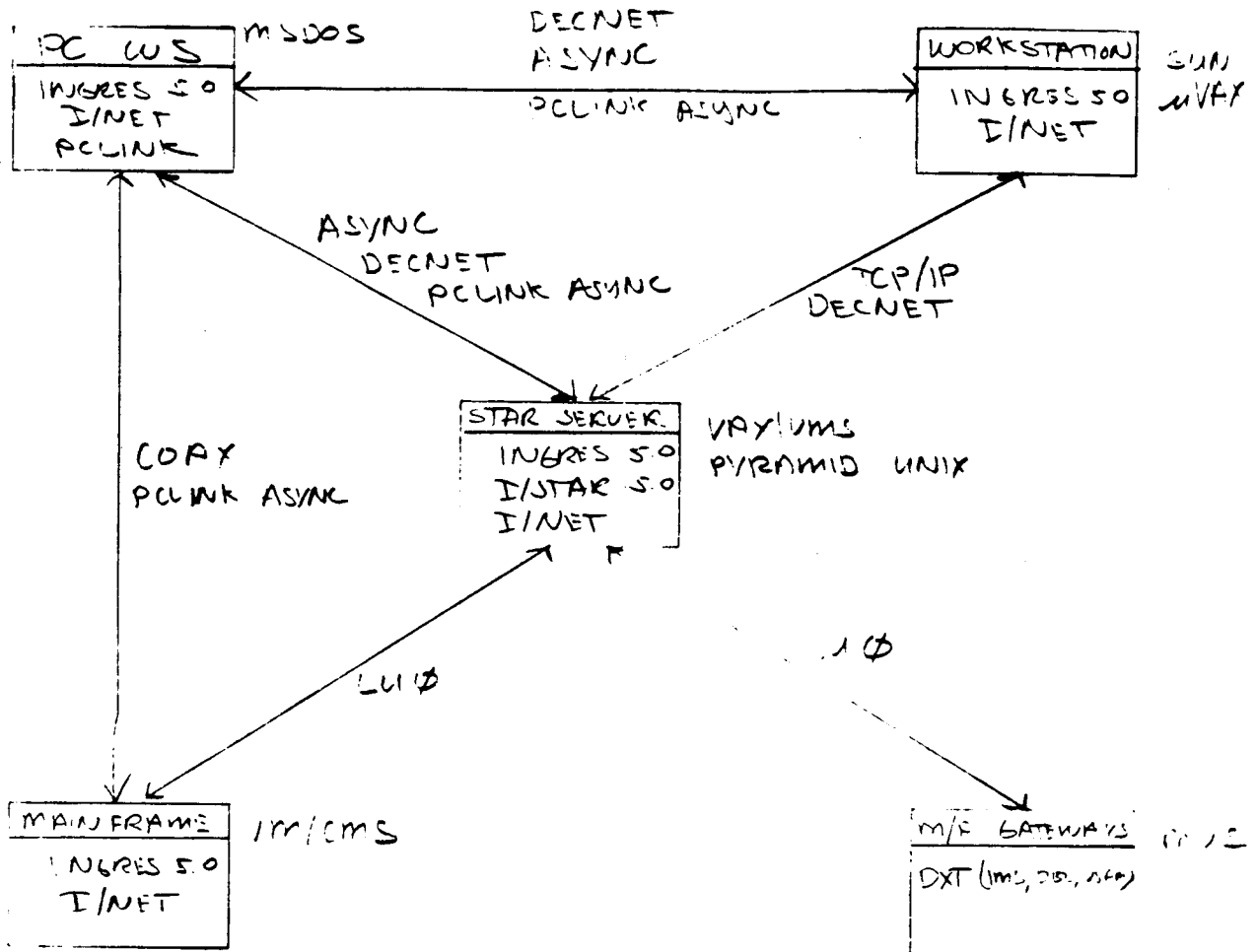
Thanks to Mike Dion, Chip Hay and Howard Shao for contributing the basic graphic representations.

### FUNCTIONALITY

This section will not be completed. The information is contained in the resource allocations and priorities.

# INGRES CONNECTIVITY

SINCE 1987



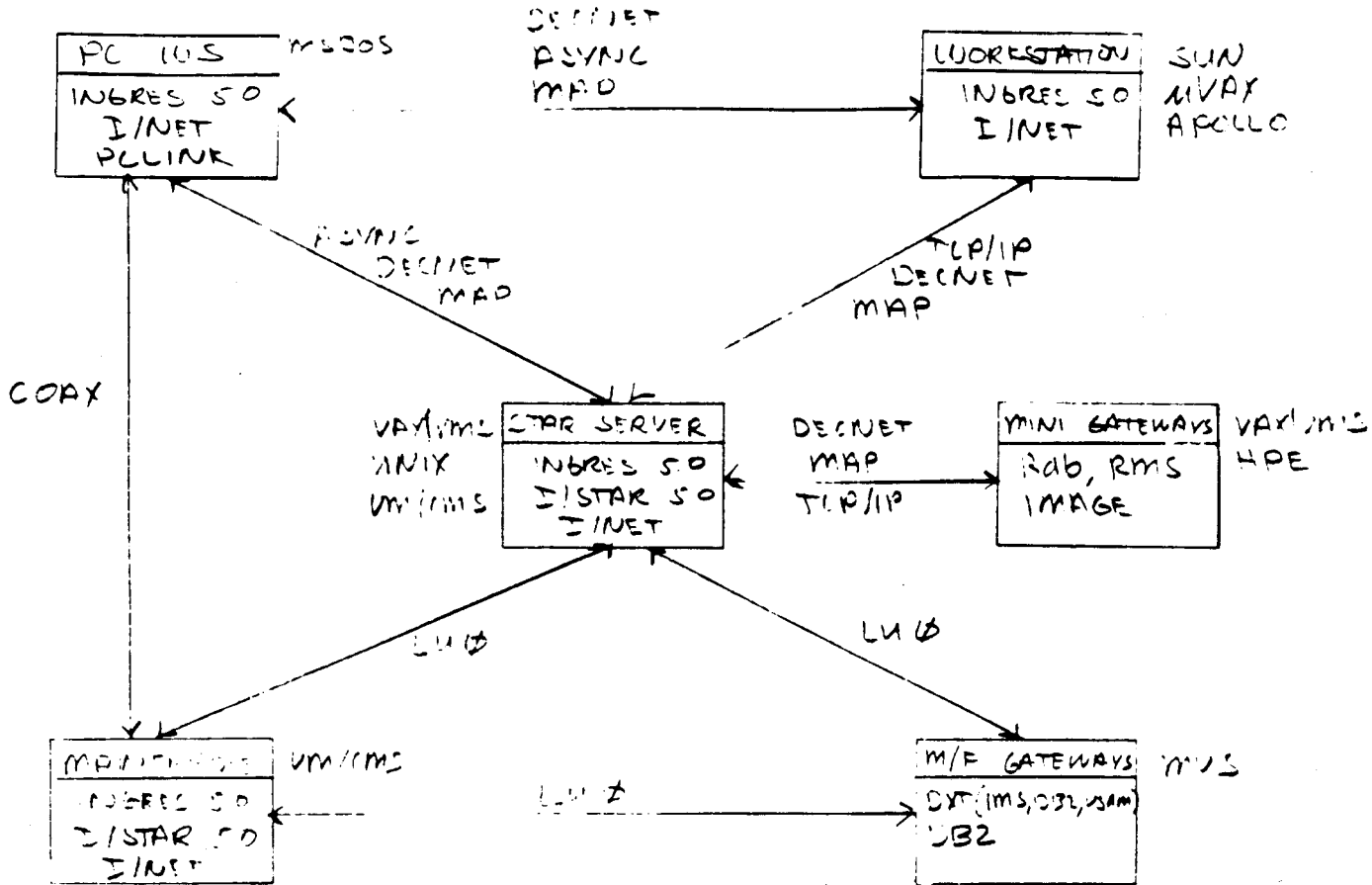
NOTES:

1. PCLINK ONLY COMMUNICATES VIA "PCLINK ASYNC" PROTOCOL
2. LU6.2 IS AVAILABLE ONLY ON VMS.
3. PC DATABASES MAY NOT FACILITATE IN A DB3.



# LINKS CONNECTIVITY - RELEASE 5.0

DECEMBER 1987

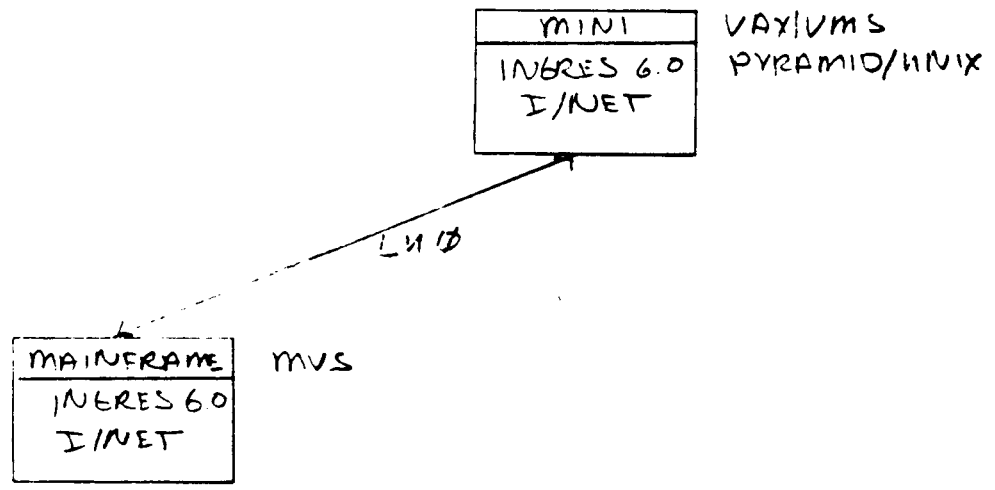


NOTES:

1. PLINK ONLY COMMUNICATES PLINK ASYNC PROTOCOL
2. LU6 IS NOT AVAILABLE ON UNIX
3. PC INBRES PROVIDES DBASE III TRANSPARENCY
4. THIS DIAGRAM APPLIES ONLY TO INBRES 5.0. OTHER A/C CONNECTIVITY IS SHOWN ON NEXT PAGE.
5. MINI GATEWAYS DEPENDENT ON 3M CONTRACT; DB2 GATEWAY DEPENDENT ON GMR CONTRACT.

INRES. (CONNECTIONS) - RELEASE A D

DECEMBER 1987

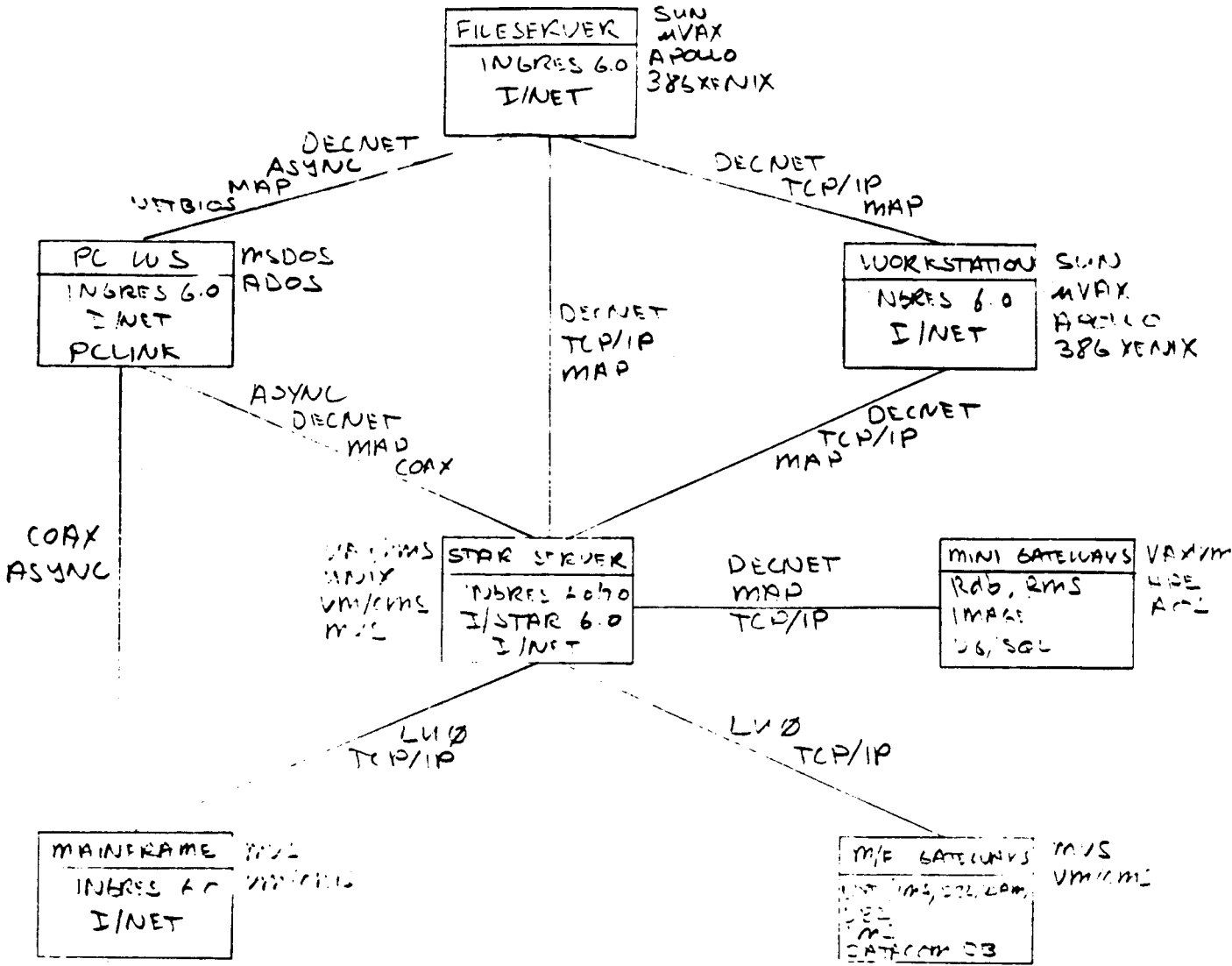


NOTES:

- 1. NO INRES/STAR CAPABILITY AVAILABLE UNTIL 1988.

# INGRES CONNECTIVITY

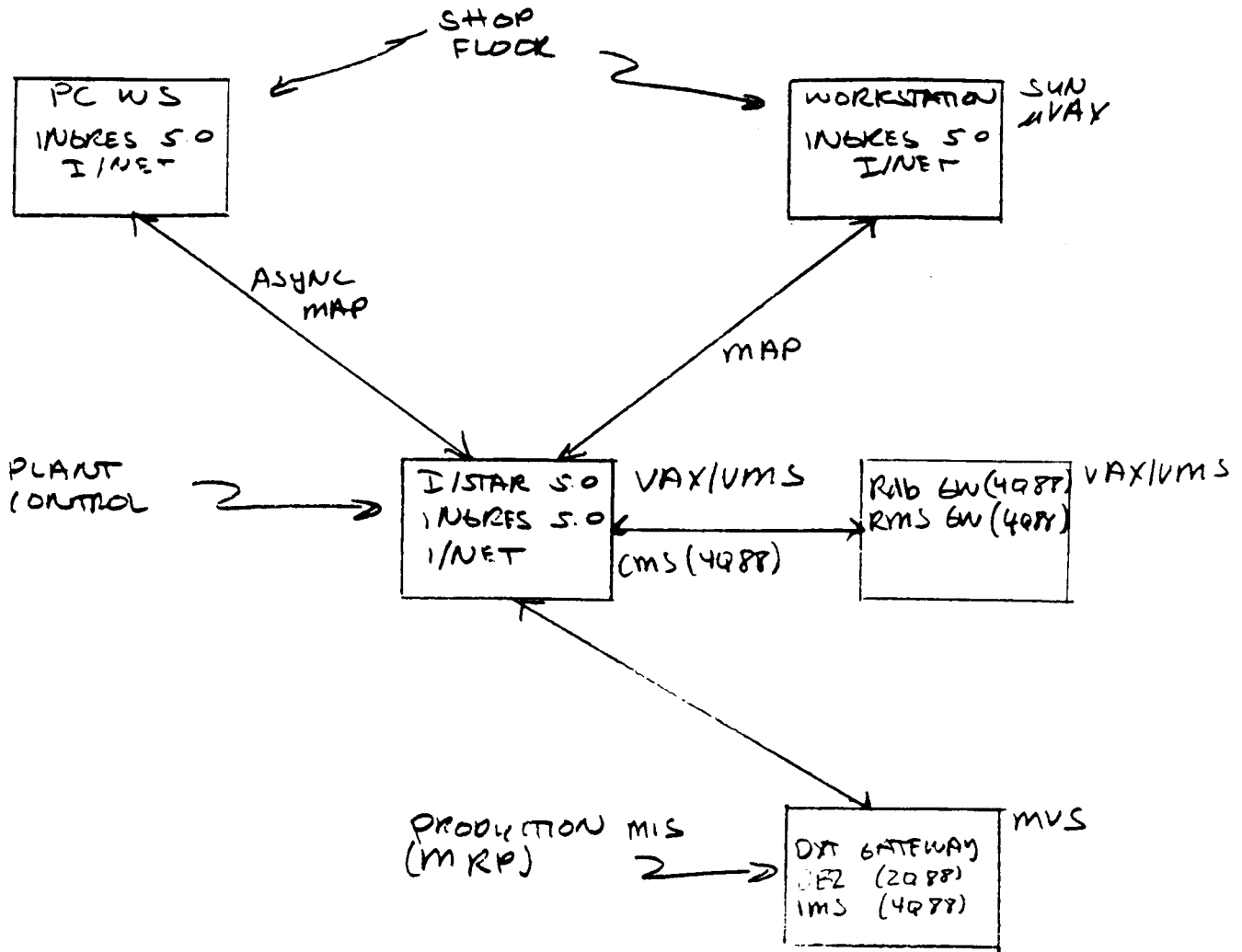
JUNE 1988



NOTES:

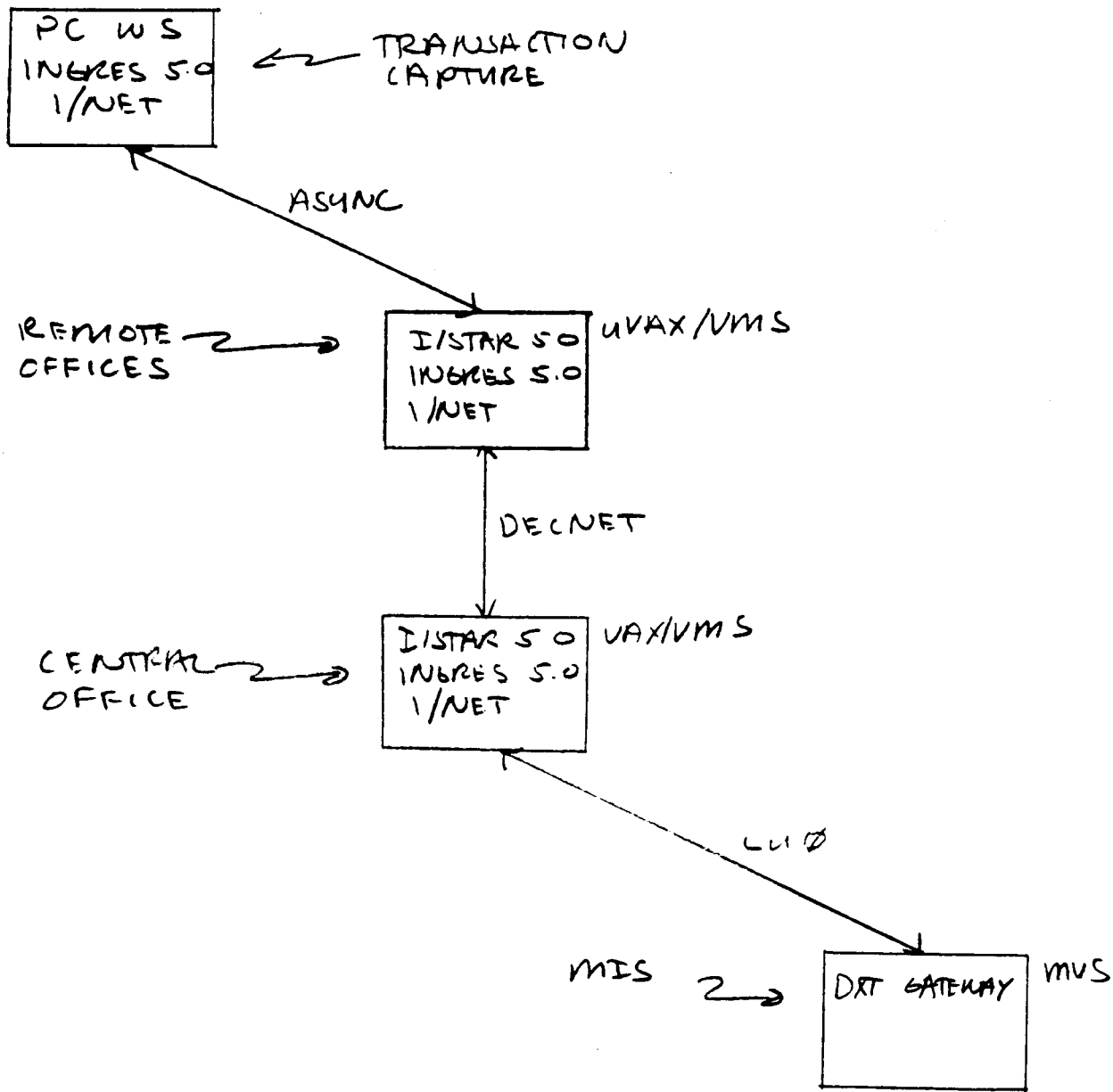
1. PC WORKSTATION MUST BE RUNNING A 6.0 COMPATIBLE VERSION OF PC INGRES.
2. LUN IS NOT AVAILABLE ON UNIX
3. PCLINK ONLY COMMUNICATES VIA "PCLINK ASYNC" PROTOCOL

# TYPICAL MANUFACTURING CONFIGURATION



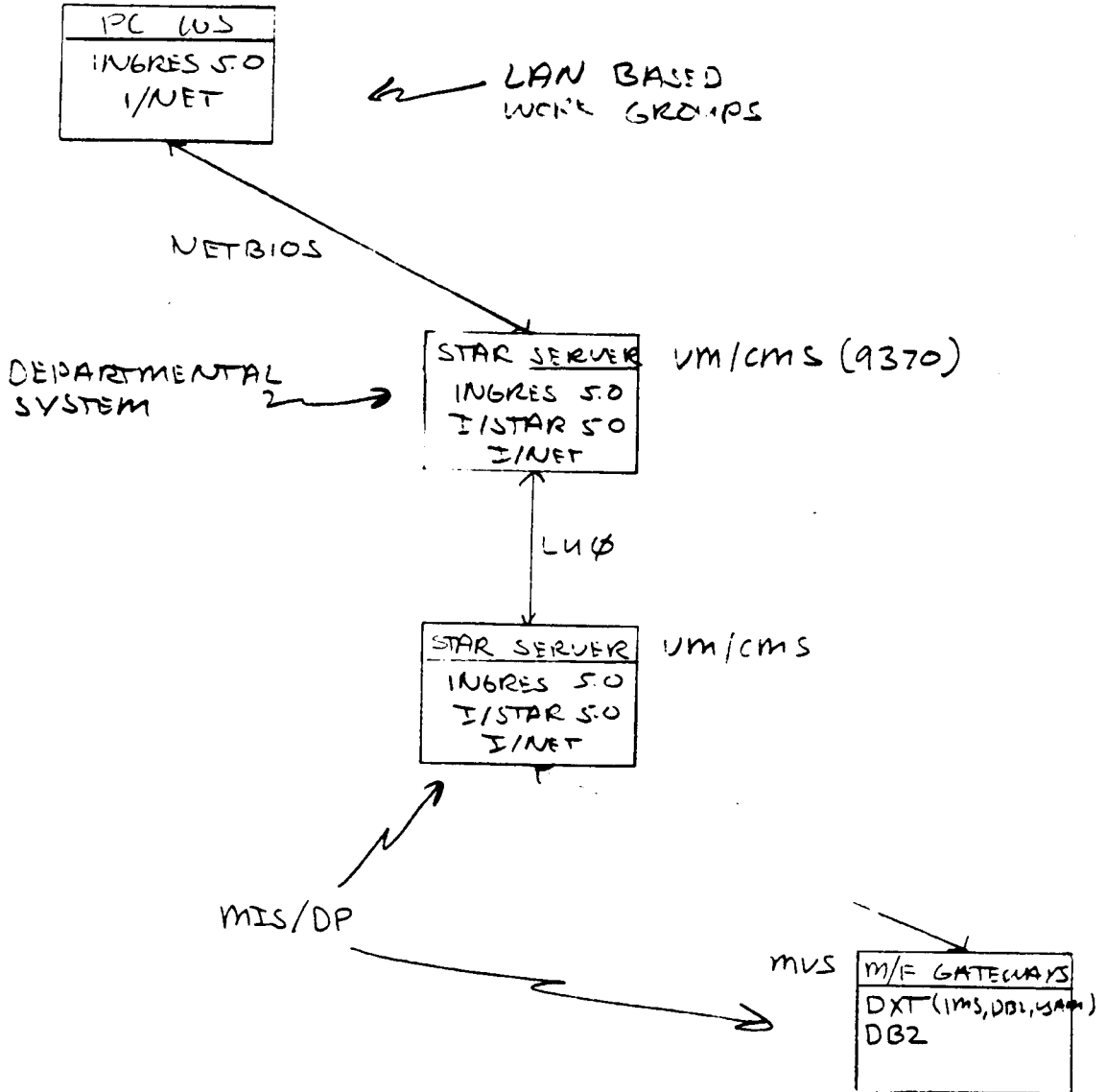
# TYPICAL DP CONFIGURATION

## DEC ORIENTATION



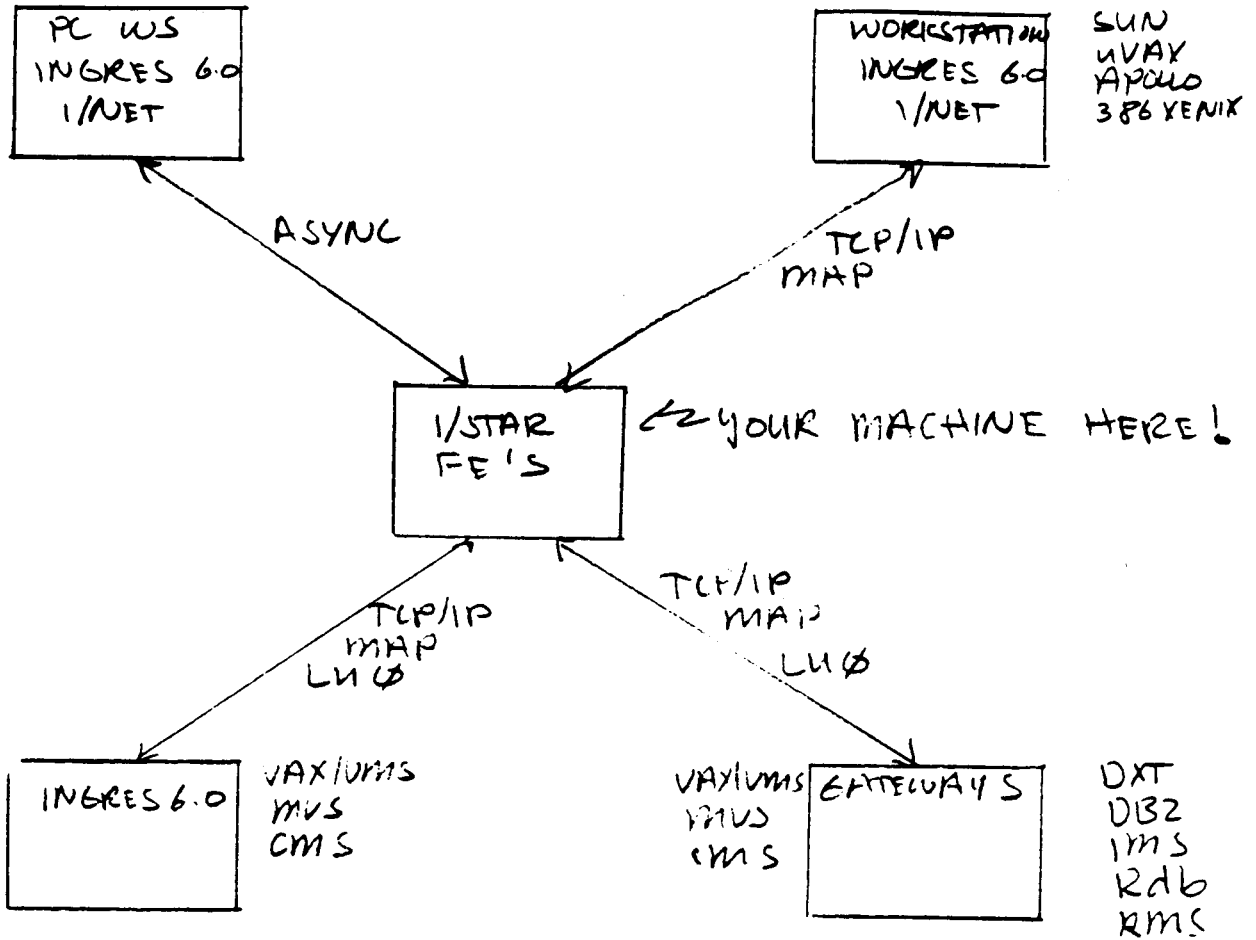
# TYPICAL DP CONFIGURATION

## IBM ORIENTATION



TYPICAL OEM CONFIGURATION

JUNE 1988



# INGRES CONNECTIVITY MATRIX

		FROM									
		PC		VMS		UNIX		VM		MVS	
		FE	I/STAR	FE	I/STAR	FE	I/STAR	FE	I/STAR	FE	I/STAR
PC	DBMS	/	/	/	A-2Q88 D-2Q88	/	A-2Q88 D-4Q88	/	L-4Q88	/	L-4Q88
	I/STAR	/	/	/	/	/	/	/	/	/	/
VMS	DBMS	A-4Q87 D-2Q88 M-2Q88	/	D-NOW T-NOW M-2Q88	D-NOW T-NOW M-2Q88	T-NOW M-2Q88 D-4Q88	T-NOW M-2Q88 D-4Q88	L-4Q87 T-4Q88	L-4Q88 T-4Q88	L-2Q88 T-4Q88	L-4Q88 T-4Q88
	I/STAR	A-4Q87 D-2Q88 M-2Q88	/	D-NOW T-NOW M-2Q88	/	T-NOW M-2Q88 D-4Q88	/	L-4Q87 T-4Q88	/	L-2Q88 T-4Q88	/
UNIX	DBMS	A-4Q87 M-2Q88	/	T-NOW D-4Q88 M-2Q88	T-NOW D-4Q88 M-2Q88	T-NOW M-2Q88	T-NOW M-2Q88	T-4Q88	T-4Q88	T-4Q88	T-4Q88
	I/STAR	A-4Q87 M-2Q88	/	T-NOW D-4Q88 M-2Q88	/	T-NOW M-2Q88	/	T-4Q88	/	T-4Q88	/
VM	DBMS	L-4Q87	/	L-4Q87 L-4Q87	L-4Q87	T-4Q88 T-4Q88	T-4Q88	L-4Q87 L-4Q88	L-4Q88	L-2Q88 L-4Q88	L-4Q88
	I/STAR	L-4Q88	/	L-4Q88	/	T-4Q88	/	L-4Q88	/	L-4Q88	/
MVS	DBMS	L-2Q88	/	L-2Q88 L-2Q88	L-2Q88	T-4Q88 T-4Q88	T-4Q88	L-2Q88 L-4Q88	L-4Q88	L-2Q88 L-4Q88	L-4Q88
	I/STAR	L-4Q88	/	L-4Q88	/	T-4Q88	/	L-4Q88	/	L-4Q88	/

TO

LEGEND:

A = ASYNC

L = COAX

T = TCP/IP

L = LU6

D = DECNET

M = MAP



A summary of the proposed resource allocations and priorities is presented on the following diagrams. Note that if you put the diagrams together, you end up with a tree structured resource allocation with individual product enhancements prioritized at the leaves. I have organized the plan in this way because there is no linear priority list that captures the true priority of each enhancement. We must continue to improve the product in all areas. The resource allocations are an attempt to weight the relative importance of classes of enhancements; the enhancement list at each leaf node is in priority order.

Note that the resource allocations are representative of the efforts to be expended in product development. It would be very enlightening to annotate the diagram with resource allocations for technical support, documentation, product engineering, training and marketing.

The resource allocations do not represent the current state of engineering. In some sense this is the allocation that will make the most sense over the next eighteen months.

The diagrams are followed by summaries of each enhancement.

#### VERSION 3 NOTES:

The diagrams are now annotated with estimated costs for the DEVELOPMENT effort required to build each enhancement. This does not include any costs for other organizations such as technical support, documentation, QA, training or marketing. Numbers in boxes are person-years to develop the enhancements on that branch of the tree. The upper box is the cost of all enhancements on that branch of the tree while the middle box is the cost of the underlined (critical enhancements) on that branch. The lower box is the actual allocation proposed for that branch after altering the resources allotted to the critical projects. In some cases we will reduce these numbers by simply doing less of the enhancement; in other cases we will only do the enhancement if external funding is available (gateways and ADT's fall in this category). If only a single box is present it represents the cost of all enhancements on that branch.

The parenthesized numbers represent person-months required for each enhancement. These numbers have been provided by development except for the unix, cms and mvs projects. I have provided rough estimates for those projects. A second set of parenthesized numbers represents the resources proposed to be allocated to that enhancement in this plan.

The parenthesized percentages on the top level diagram represent the actual percentages as proposed in version 3 of this plan.

The next step in the planning process will be to determine the costs and available resources in other participating groups.

## ENHANCEMENT PROPOSAL

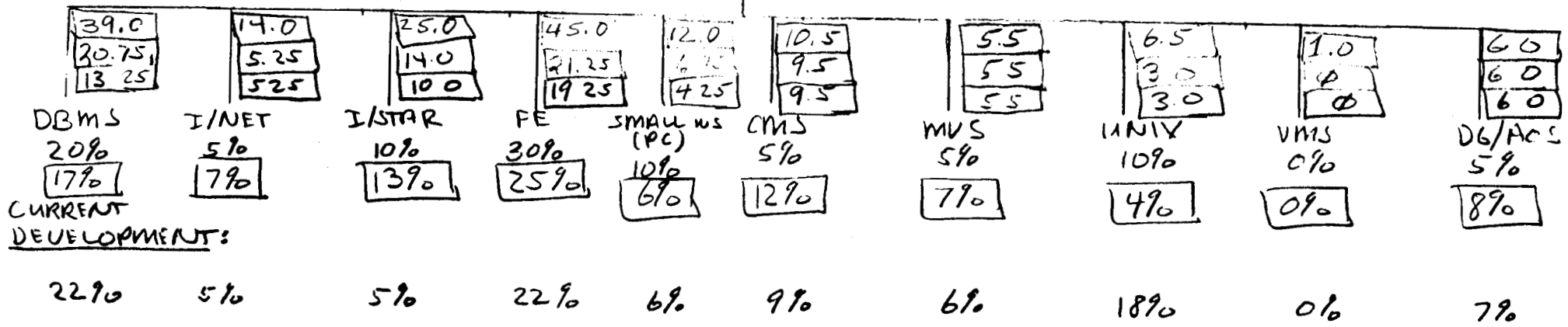
The proposal is to do only the underlined (critical) projects since we only have enough resources to cover those. In some cases the scope of critical projects has been reduced to fit available resources and in some cases the projects will only be done if external funding is found.

Note that our goal is only to allocate 80% of the available resources to this plan leaving 20% for unanticipated requirements. However, this plan requires ALL development resources for execution. A reduction of 15.2 person-years must be made to free 20% of the development resources.

The 76.0 person-years was derived as follows:

Development 9/87 to 9/88	45 PY
Development 4/87 to 9/87	5 PY
Additional DG staff 4/87 to 9/88	6 PY
Incremental staff increase (avg)	5 PY
VM and MVS	9 PY
UNIX (not all unix allocated here)	6 PY
	-----
Total	76 PY

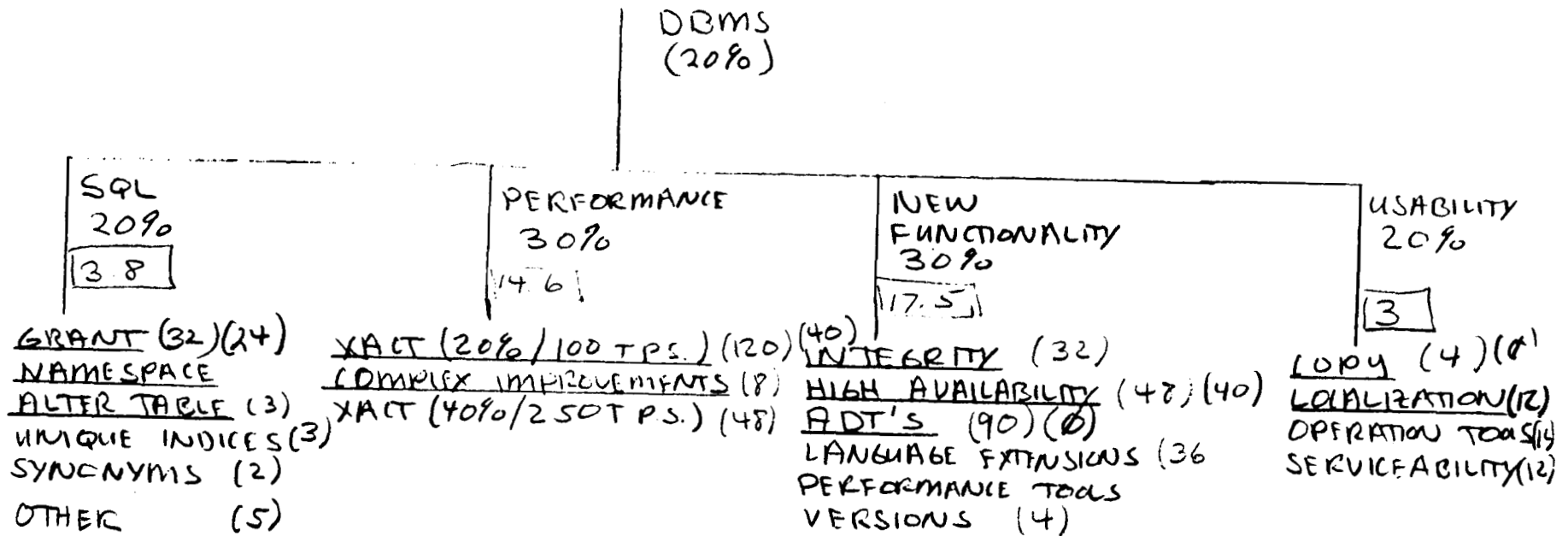
100%  
 164.5  
 92.0  
 76.0



NOTES:

1. UNDERLINED ENHANCEMENTS ON FOLLOWING PAGES ARE REQUIRED; OTHERS WILL BE DONE IF RESOURCES ARE AVAILABLE.

OVERALL RESOURCE ALLOCATION



REQUIRED: TOTAL = (249) or 20.75

(35)

(128)

(170)

(16)

REDUCTION NOTES:

1. REDUCED SCOPE OF SECURITY CHANGES
2. REDUCED PERFORMANCE IMPROVEMENTS
3. REDUCED HIGH AVAILABILITY IMPROVEMENTS
4. ADT'S MUST BE USER SUPPORTED ⇒ ADDITIONAL RESOURCES
5. COPY ENHANCEMENTS MOSTLY IN 6.0; ELIMINATE

I/NET  
5%

14.0

- TSI (ICL) (9)
- LUØ CMS (9)
- DECNET PC (9)
- DECNET ULTRIX (9)
- ASYNL UNIX (9)
- COAX (PC, CMS) —
- TCP/IP CMS (9)
- NETBIOS PC (9)
- TOOLKIT (9)
- MAP (VMS, UNIX, PC) (24)
- TCP/IP PC (9)
- TCP/IP VMS (DEC) (9)
- LU6.2 APPC (PC, CMS) (18)
- PLINK UPERAVE TO I/NET (9)
- HYPERCHANNEL (9)

I/STAR  
10%

NEW  
FUNCTIONALITY

60%

15.0

- DEFERRED COPIES (12)
- FULL QUERY LANG. (12)
- UNION VIEWS } (60)
- JUPITER/SOL }
- TRANSACTIONS (12)
- COPIES (12)
- FRAGMENTS (24)
- CENTRALIZED CONTROL (12)
- PERFORMANCE (24)
- OPERATION TOOLS (12)
- GMR FUNCTIONALITY (8)

GATEWAYS  
40%

10.0

- DXT (12) (0)
- DB2 (12) (0)
- Rdb/RMS (24) (0)
- USER \$\$
- IMS (36)
- VSAM (12)
- TOOLKIT (12)

REQUIRED: TOTAL (63) or 5.25

(144) or 14.0

REDUCTION NOTES:

1. GATEWAYS MUST BE USER SUPPORTED ⇒ ADDITIONAL RESOURCES

FRONTENDS  
30%

APPLICATION  
TOOLS  
50%  
27.3

END USER  
TOOLS  
30%  
11.3

DESIGN  
TOOLS  
10%  
3

EQUIV  
10%  
3

DATA DICTIONARY (31)  
WINDOW/BITMAP I (13)  
SQL FRONTENDS (0)

FORM ENHANCEMENTS (17)

OSL DEBUGGING (11)

MULTI-USER ABF (18)

ABF USER INTERFACE (24) (0)

LOCALIZED APPLICATIONS (12)

OSL ENHANCEMENTS (45)

WINDOW/BITMAP II (23)

OSL SOURCE CONTROL (6)

INTEGRATE FORMS/REPORTS/GRAPHS (33)

TEXT & DOCUMENT HANDLING (17)

USER AID'S (20)

REF INTEGRITY (6)

END USER QUERY/REPORT/GRAPH (56)

RW XTAB/DETAIL/QUERY (16)

DBA-BY-FORMS (9)

RBF ENHANCEMENTS (12)

VIGRED ENHANCEMENTS (17)

END USER ABF (22)

DBA-BY-FORMS (DDB) (12)

VIGRAPH (9)

FE CLEANUP (6)

DB DESIGN (21)

APPLICATION DESIGN (12)

NEW FUNCTIONS (36)

REQUIRED: TOTAL (253) or 21.25

(116)

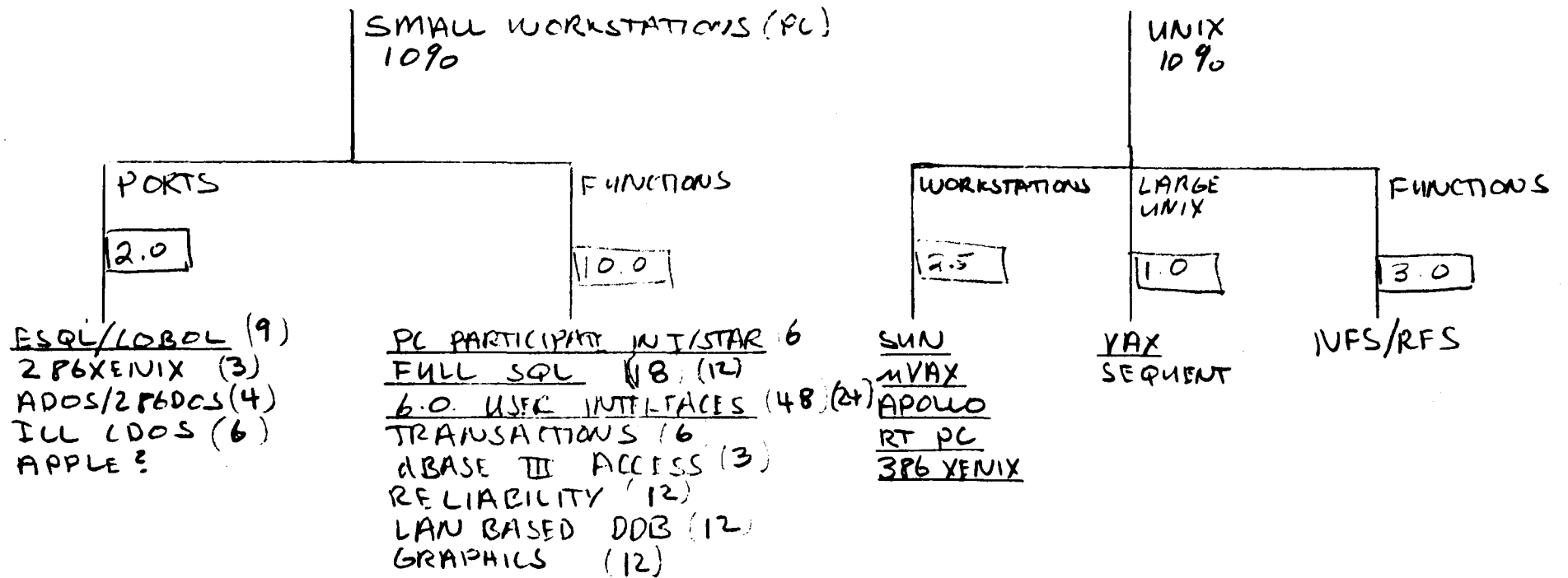
(70)

(21)

(36)

REDUCTION NOTES:

1. ABF USER INTERFACE ENHANCEMENTS MOSTLY BUDGETED IN 6.0.

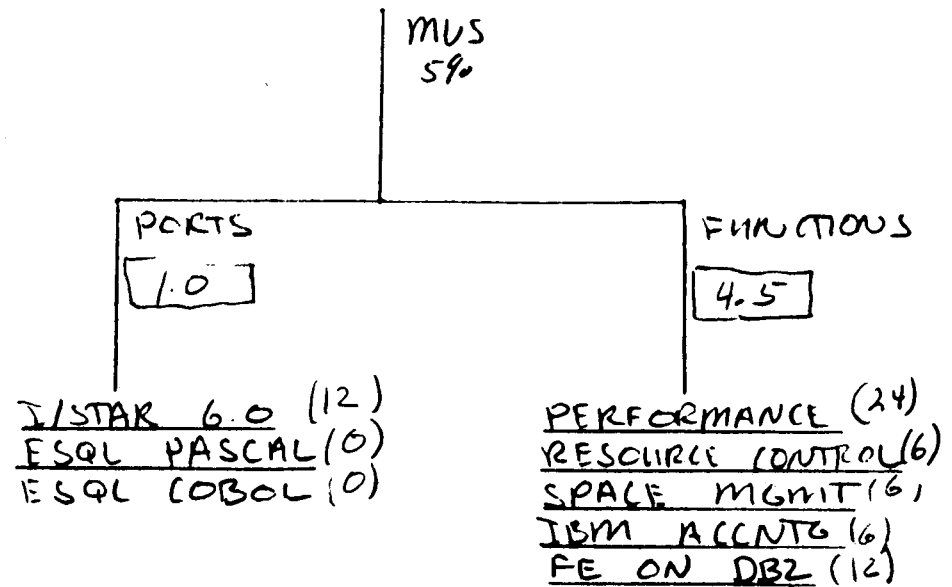
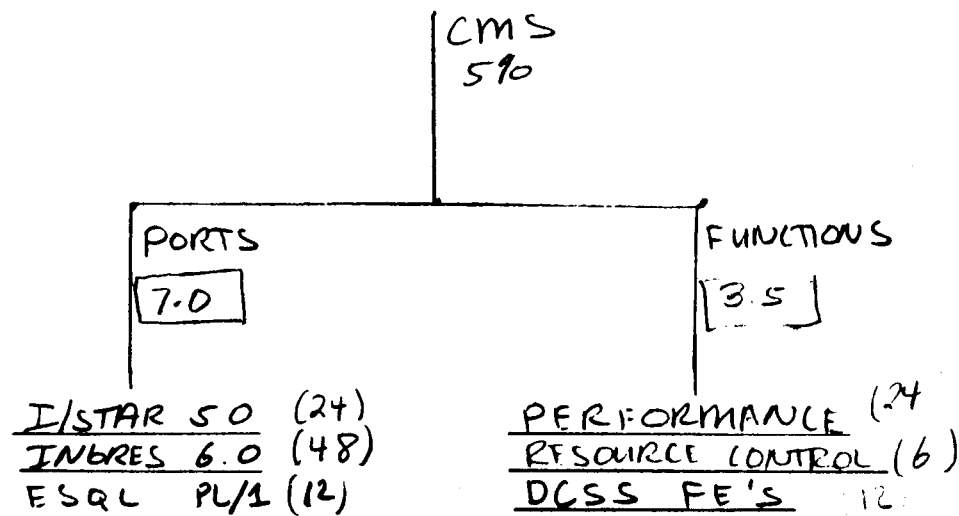


REQUIRED: TOTAL: (81) or (6.75) (26) or (3.0)

(9) (72) (30) (6)

**REDUCTION NOTES:**

1. REDUCED COSTS FOR FULL SQL AND 6.0 USER INTERFACES BY ASSUMING WE WILL RUN FULL 6.0 ON VIRTUAL MEMORY SYSTEMS. THUS, THIS IS A PORT.



REQUIRED: TOTAL (126) - (10.5)

(66) or (5.5)

(84)

42

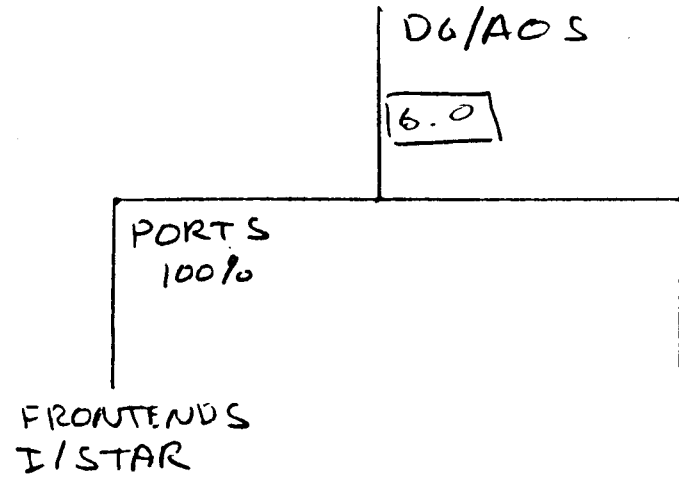
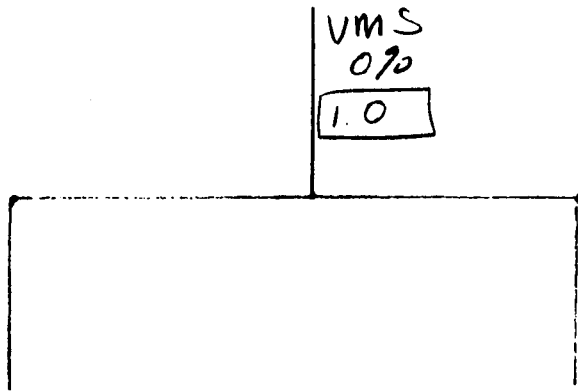
(12)

(54)

NOTES:

1. ESQL/PASCAL AND ESQL/COBOL FOR MVS ALREADY BUDGETED IN 6.0 PORT.





REQUIRED: TOTAL  $\emptyset$

(72) or 6.0

## SQL COMPATIBILITY

## 1. GRANT

## WEAT:

SQL compatible permission system. Critical to support the basic GRANT and REVOKE functionality. Cascading revocation of permissions is not essential.

## WEY:

Market requirement for both our users and prospects.  
Required to meet our ICL commitments.  
Includes functionality required by our users.  
Eliminates an market objection to INGRES.

## 2. Namespace

## WEAT:

SQL compatible table naming scheme. We currently do not allow users to name (reference) tables created by other users (except the DBA). Remove this restriction for SQL compatibility.

## WEY:

Market requirement for both our users and prospects.  
Required to meet our ICL commitments.  
Includes functionality required by our users.  
Eliminates an market objection to INGRES.

## 3. Alter Table

## WEAT:

SQL compatible ALTER TABLE command. Add a column is essential. Other capabilities are less important.

## WEY:

Market requirement for both our users and prospects.  
Required to meet our ICL commitments.  
Includes functionality required by our users.  
Eliminates an market objection to INGRES.

## 4. UNIQUE INDICES

## WEAT:

Ability to create multiple indices with the UNIQUE constraint with the CREATE INDEX command.

## WEY:

Market requirement for both our users and prospects.  
Required to meet our ICL commitments.  
Includes functionality required by our users.  
Eliminates an market objection to INGRES.

## 5. SYNONYMS

## WEAT:

DB2 compatible synonyms.

## WEY:

Market requirement for both our users and prospects.  
Required to meet our ICL commitments.  
Includes functionality required by our users.  
Eliminates an market objection to INGRES.

## PERFORMANCE

### 1. Transactions (20% more efficient and 100 xact/sec.)

#### WEAT:

Improve our transaction throughput particularly on larger machines. The exact projects will be determined in the next phase of planning but could include compiled queries, record locking, multiple versions, faster logging and new index update strategies. Decrease resources used per transaction by 20% and increase maximum transaction throughput to 100 xact/sec.

#### WEY:

This is a major evaluation criteria for a DBMS. Every competitor would like to position their system as THE FASTEST. We must continue to invest to make sure that we have as valid a claim as any system. We are currently as good or better than our primary competitors but all systems are improving in this area.

### 2. Improved Complex Query Performance

#### WEAT:

Better optimization strategies, new join strategies, eliminate cases where the optimizer makes poor choices, enhance INGRES to use multiple indices if that is advantageous.

#### WEY:

We are the acknowledged leader in this technology but must eliminate the major weaknesses in our current implementation to take maximum advantage of this in our marketing efforts. This will also be a significant benefit to users and prospects who will have a much harder time writing queries that cannot be properly optimized. It is quite a blow when one of a prospects first few queries runs slow.

### 2. Transactions (40% more efficient and 250 xact/sec.)

#### WEAT:

Improve our transaction throughput particularly on larger machines. The exact projects will be determined in the next phase of planning but could include compiled queries, record locking, multiple versions, faster logging and new index update strategies. Decrease resources used per transaction by 40% and increase maximum transaction throughput to 250 xact/sec.

#### WEY:

This is a major evaluation criteria for a DBMS. Every competitor would like to position their system as THE FASTEST. We must continue to invest to make sure that we have as valid a claim as any system. We are currently as good or better than our primary competitors but all systems are improving in this area. This is probably a 1989 requirement.

## NEW FUNCTIONALITY

### 1. Enhanced Integrity Constraints

#### WEAT:

Referential Integrity as well as support for more general integrity constraints. This is most likely implemented as a mechanism for

storing general integrity rules in the database which are run whenever updates are done.

**WHY:**

This is an essential capability for serious application shops (you can read this GM, EDS, KODAK, 3M, ...). Our competitors either do not have this function or do not know how to exploit it effectively (Rdb, SUPRA) but it is widely known as a requirement and everyone is working on this. Once competitors start to exploit this capability we will have a serious marketing problem. SYBASE will come to market with this capability and IBM is known to be working on this.

Referential Integrity is the most widely known type of integrity. Extending this capability would provide us with a significant market advantage. It would make application development and database administration much easier and really impress sophisticated application developers (see list above). The only competitor that appears to have anything here is SYBASE; a timely implementation could give us a significant advantage.

## 2. HIGH AVAILABILITY

**WHAT:**

Features required for the operation of highly available databases and production applications. These two classes of applications require the same kinds of functionality. Includes

- On-line Utilities such as checkpoint, recover, audit.
- Modify and Index with table remaining available.
- Resource control such as limiting I/O and CPU and limiting allowed query cost estimates. Also, space management functions for large databases and locking controls.
- Relations spanning volumes for large tables, performance and fail-soft capabilities
- Partial checkpoints and recovery for large databases.

**WHY:**

This is required to support serious production applications. We have no way to maintain a database without taking it off-line. Large applications like those at GE, Citibank, GM, etc. cannot afford such downtime. This will soon become more of a problem since SYBASE is providing support for on-line maintenance. We should be able to beat or match our other competitors in bringing this function to market.

## 3. ABSTRACT DATATYPES

**WHAT:**

Abstract Datatypes is a mechanism for allowing users to define their own datatypes. It includes support for domains, user defined datatypes and user defined functions. Also included in this project is support for a multi-dimensional access method (such a B-trees) for optimizing access to complex user defined datatypes.

**WHY:**

This single mechanism can solve a large number of user problems. It immediately provides domain support which is requested by all serious DBA's. It will allow users to store graphics, binary and image data by defining their own datatypes and also allow users to define their own set of useful datatypes. It also allows users to add unique functionality at their installation; examples would be secure datatypes for DoD installations and special semantics associated with languages other than English. We will almost certainly be the first to offer this level of functionality.

#### 4. LANGUAGE EXTENSIONS

**WHAT:**

In priority order these extensions are:

- Outer Join
- Transitive Closure (connect-by)
- Statistical Functions (mean, std dev)
- Set operations (set union, intersect, minus)
- Additional Functions (output formatting)

**WHY:**

These are useful functions and many of competitors have some of them.

#### 5. PERFORMANCE TOOLS

**WHAT:**

Tools for monitoring the performance of your database and applications to provide you with the information you need for tuning. An aggressive plan would include a tool to assist you in making tuning decisions. Key performance parameters to monitor include resources used, query and transaction throughput, keys used, non-key qualifications used, locks acquired and deadlocks detected.

The second tool would use this information as input to make recommendations for changes to your physical schema and/or applications.

**WHY:**

The first tool is a necessity for building successful, high performance applications. The second tool would be a major plus since it would make it possible for users to build applications successfully with less system knowledge. We could get a lot of mileage out of this.

#### 6. VERSIONS

**WHAT:**

The ability to provide multiple logical versions of a table for use in very long running transactions such as editing a design in a CAD system.

**WHY:**

Very important for engineering and manufacturing applications such as CAD where concurrency has a very different meaning. This, along with ADT's, will give us a very strong product for those markets. It is also useful in conventional applications as well.

#### ENHANCEMENTS

##### 1. COPY ENHANCEMENTS

**WHAT:**

Provide better diagnostics on failed copy operations, support for more file formats and support for more file types. A second class of request is to support more of the INGRES functionality (such as permits and integrities) in copy.

**WHY:**

This is a serious usability problem, particular when you are loading hundreds of megabytes of data. It is a significant sales hurdle once users try to load a large file with even a single error in it.

##### 2. LOCALIZATION

**WHAT:**

Provide support for local (country) sorting conventions.

**WHY:**

Very important for international sales. Once implemented, INGRES will have all the basic functionality required for full local support.

**3. OPERATIONS TOOLS**

**WHAT:**

Tools to make management and control of your database easier. Includes capabilities such as moving databases, journals and checkpoints and auditing for both security and integrity reasons.

**WHY:**

Another feature we can sell as part of our "production quality" relational dbms.

**4. SERVICABILITY**

**WHAT:**

Additional diagnostic and tracing tools for helping users recover from error situations.

**WHY:**

This improves the reputation of our product and is required if we are going to control costs in the areas of support, training and maintenance.

Ports, networks and gateways are self-describing. This section will only describe the new functionality.

## NEW FUNCTIONALITY

### 1. DEFERRED COPIES

#### WHAT:

A copy of a table in another local database. The copies are not guaranteed to be transaction consistent. INGRES/STAR will guarantee that the copy will be updated eventually but it will not be updated by the completion of the transaction. This allows you to trade the currency of the copy for better performance. There are several issues associated with actually using the copy and switching between the original and the copy on failure which require more thought.

#### WHY:

This provides the simplest copy mechanism for exploiting the potential reliability advantages of copies. Nearly every user who has tested INGRES/STAR has requested this feature (as a minimum). It definitely can be sold and will serve as a clear indication of our ability to provide more sophisticated kinds of failure transparency in the future.

### 2. QUERY LANGUAGE

#### WHAT:

Provide support for the complete query language (QUEL and SQL). Currently INGRES/STAR does not support certain commands which make it difficult to port applications from local INGRES to INGRES/STAR. This includes the commands modify, index and relocate.

#### WHY:

Important to support the complete DDL as well as DML. This will make it much easier to build and manage larger distributed databases. It will also make our frontends easier to port to INGRES/STAR.

### 3. SQL/JUPITER

#### WHAT:

This is two related projects:

Support full 6.0 SQL. This requires that we move SQL parsing to INGRES/STAR. The best approach is to re-host STAR within the Jupiter(6.0) architecture and take advantage of all the SQL work done there.

Support a server version of INGRES/STAR. This will be important to reduce the number of processes/tasks/virtual machines required to support distributed processing.

#### WHY:

Applications built on 6.0 SQL will not run on STAR until this project is completed. A key point is that all our frontends will be SQL with the implication that our frontends will not run - a major blow to transparency!

### 4. UNION VIEWS

#### WHAT:

View definitions which include unions. This is a cheap way to get capabilities similar to fragments (but with poor performance) until

we can get fragments built.

WEY:  
Requested by users and prospects.

#### 5. TRANSACTIONS

WEAT:  
Full two phase commit for multi-site update transactions.

WEY:  
Critical for full location transparency and also a requirement before we can replicate the global dictionary. The global dictionary must be replicated ASAP since it looks to users like the achilles heel of STAR.

#### 6. CONSISTENT COPIES

WEAT:  
Transaction consistent copies. Will allow us to automatically take advantage of copies to improve performance and allows STAR to switch to a backup copy automatically on a local site failure.

WEY:  
Allows us to build true fail-soft systems. Allows us to manage the global data dictionary transparently.

#### 7. FRAGMENTS

WEAT:  
Ability to distribute parts of a table among several local databases.

WEY:  
Extremely useful in tuning the system for better performance. Also useful in allowing us to build a distributed data dictionary.

#### 8. CENTRALIZED CONTROL

WEAT:  
Currently we support "local autonomy". The local database is managed by its own local DBA. We need to provide support for organizations that want to treat the distributed database as a single database for management and administration.

WEY:  
Our early STAR sites indicate that many of their applications are new applications and they intend to manage them from a single, central point.

#### 9. PERFORMANCE

WEAT:  
Performance improvements such as parallel execution of local queries, support for compiled queries (needed for DB2), more and better optimization.

WEY:  
We limit the set of applications we can support. Performance improvements are the best way to expand the available market.

#### 10. OPERATION TOOLS

WEAT:  
Tools for actually managing your distributed database such as backup, recovery and performance monitor.



WHY:

These are the tools required to run real production applications. Once the basic functionality is in place, these will become more important.

## APPLICATION TOOLS

## 1. DATA DICTIONARY

## WHAT:

Data dictionary is a database and a collection of tools.

Documented dictionary schema for logical design information, database structure and application structure (eg. forms, reports, procedures). Designed for both local and distributed databases.

Upgrade existing frontends to use and display relevant information from the dictionary.

New tools for summary reporting and impact analysis.

Version control and security for dictionary information.

## WHY:

The number one requests from the user community and will increasingly be an issue in sales situations as competitors begin to provide these capabilities. We could get tons of mileage out of this.

## 2. WINDOW/BITMAP I

## WHAT:

Support for our forms system running on X-window and MS-window (X-window is highest priority since it is likely to be supported on the PC). This will support a mouse for commands and dialog boxes for messages, prompts, etc.

## WHY:

Windows will be the basis for user interfaces in all environments. Support it or leave the user interface business.

## 3. SQL FRONTENDS

## WHAT:

Convert our frontend tools to use SQL to access the database.

## WHY:

Required to implement our complete strategy of tools running against INGRES, INGRES/STAR and gateways. Note that this is supported by the DG deal.

## 4. FORMS ENHANCEMENTS

## WHAT:

Support for forms enhancements requested by users and needed to take better advantage of our windowing support. Support for dynamic forms, pop-up fields, more elegant trim (arbitrary boxes), fonts, etc. Also, fix some holes in the validation/activation systems to make application development significantly easier. Note that this implies that VIFRED, EQUDEL and OSL will be upgraded to make these features available.

## WHY:

These features are needed to take full advantage of our windowing capabilities or to make it easier (much easier) for users to write true production quality applications.

## 5. OSL DEBUGGER

### WHAT:

A debugger of ABF/OSL applications.

### WHY:

This is our primary application development environment and we provide no way for users to debug or check out the logic of their OSL code. This is a major productivity problem both for our users and for technical support. This will make the product substantially friendlier.

## 6. MULTI-USER ABF

### WHAT:

Allow development of ABF applications by a team of developers rather than individual developers. This is primarily support for concurrency control on application objects and revise the notion of the owner of a fragment of an application.

### WHY:

A major hindrance to development of large applications and a very popular request from our users.

## 7. ENHANCED ABF INTERFACE

### WHAT:

Significant upgrade to the ABF user interface.

### WHY:

This is our oldest interface and is showing its age. It would be a major improvement for both sales situations and current customers by making ABF easier to learn and use.

## 8. LOCALIZED APPLICATIONS

### WHAT:

Allow user applications to be "localized" for particular countries without changing the source code. We are currently building the mechanism for Relational Technology applications to be localized in this manner and need to extend that to user applications.

### WHY:

Our largest users are multinational and have plans to run applications in several countries. This would be a major selling point for such organizations and will become even more important with the deployment of INGRES/STAR applications.

## 9. OSL ENHANCEMENTS

### WHAT:

More powerful OSL constructs, primarily object-oriented OSL. There are also some minor enhancements that could be done quickly to improve usability while we work on object-oriented OSL.

### WHY:

This is the next generation of "4GL's". We should emphasize our lead in providing innovative solutions to our customers problems.

## 10. WINDOW/BITMAP II

**WHAT:**

Additional exploitation of the window environment. This section can be completed after completion of WINDOW/BITMAP I.

**WHY:**

Windows will be the basis for user interfaces in all environments. Support it or leave the user interface business.

**11. OSL SOURCE CONTROL**

**WHAT:**

Version management for OSL source code.

**WHY:**

Available in all modern programming environments. Another feature we could sell as more advanced solutions to your problems than those of our competitors.

**12. INTEGRATE FORMS/REPORTS/GRAPHS**

**WHAT:**

Provide a single type of display object rather than separate forms, reports and graphs. Convert VIFRED into a single editor for all three types of objects. Allow graphs to be displayed on forms and reports.

**WHY:**

Will make the system much simpler and easier to use. Also provides a lots of additional functionality on window systems. Again, market this item as an advanced solution although it may not be very advanced when we actually implement.

**13. TEXT AND DOCUMENT HANDLING**

**WHAT:**

Better support for managing text and, possibly, documents within the user interfaces. Not well defined at present.

**WHY:**

Lots of our users are trying to do basic word processing type applications with INGRES. Provide specific support for those applications.

**END USER TOOLS**

**1. END USER QUERY, REPORT AND GRAPH**

**WHAT:**

A single tool for end user query and reporting. Possibly a combination of an enhanced QBF and an enhanced RBF. Exactly how to go about getting this functionality can be determined later but what we need is clear.

**WHY:**

We need this to compete effectively in end user evaluations. Our separate tools are not getting the job done.

**2. REPORT WRITER CROSSTAB AND QUERYING ENHANCEMENTS**

**WHAT:**

Crosstab reports.

Multiple query statements to set up a report.

Multiple details in a report.

**WHY:**

These capabilities are all needed for serious report applications. Without them we look like a lightweight reporting system.

**3. END USER APPLICATION DEVELOPMENT**

**WHAT:**

A tool for end users to build simple applications. ABF is recognized as an excellent tool for expert application developers but we leave end users without appropriate tools. This likely could be built as an extension to QBF with the possibility of converting your simple QBF application to an ABF application.

**WHY:**

Another case where we are unable to compete effectively in end user evaluations.

**4. DBA-BY-FORMS**

**WHAT:**

An easy way for end users to manage a database. Includes forms interfaces to copy, modify, index, etc. so users don't have to deal with the query language directly.

**WHY:**

Another case where we are unable to compete effectively in end user evaluations.

**5. RBF ENHANCEMENTS**

**WHAT:**

Enhance both the interface and functionality of RBF. This and the end user tool could likely be merged into one development effort and/or one product.

**WHY:**

We need this to compete effectively in end user evaluations. Our reporting tools are either not powerful enough or too hard to use.

**6. VIFRED ENHANCEMENTS**

**WHAT:**

Upgrade to the VIFRED user interface. This would likely be based on the enhancements to the forms system for window support.

**WHY:**

Will make VIFRED easier to use and more impressive in demo situations.

**DESIGN TOOLS**

**1. DATABASE DESIGN**

**WHAT:**

A tool for logical and physical database design.

**WHY:**

This is an area of system development that is getting more and more attention. We can get a lot of mileage out of this in the market

and a lot of good will from our users who are desperate for this kind of tool.

## 2. APPLICATION DESIGN

### WHAT:

A tool for designing application systems with emphasis on the support of ABF applications.

### WHY:

This is an area of system development that is getting more and more attention. We can get a lot of mileage out of this in the market and a lot of good will from our users who are desperate for this kind of tool.

PAUL

INGRES PRODUCT STRATEGY AND PLAN MANAGEMENT

This plan will be managed by the SPC using an approach similar to that used by the architecture committees for managing the product architecture.

Once the plan is approved (approval expected in february) changes to the plan must be approved by the SPC.

The SPC will meet monthly to address minor changes to the plan. For example, minor changes to the functionality of the approved enhancements or re-prioritizing INGRES/NET protocols to adjust for new contracts. The SPC will be responsible for approving/rejecting such changes and publishing the adjustments to the plan in a timely fashion.

The SPC will address significant changes to the plan once each quarter. This would include major changes to the plan as well as additions over time to maintain the 18 month window of the plan.

Items to be considered by the SPC must be submitted via E-mail at least one week in advance of the SPC meeting. An agenda will be published prior to each meeting and minutes will be published after each meeting.