Algorithms for Access to Distributed Product Information

Final Report to the Naval Research Laboratories

Center for Design Systems
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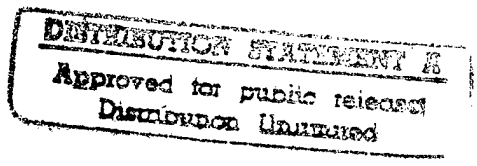

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Abstract

This study examined the use of distributed databases in a military buying setting. PartNet was built to test the hypothesis that a distributed database, operating over the Internet would yield significant advantages above the current supply paradigm. The lessons learned are: 1. this is a feasible approach, 2. vendors will support the use of this system, and, 3. PartNet offers significant savings in lead time for the warfighter.

Introduction

The management military systems requires access to information that is geographically distributed around the globe. In peacetime or at war, the difficulty in locating that information represents a serious threat to operational success. This proposal is about the acquisition, display, and management of distributed information. Although the focus of the work is on product information, the research done here has broad applicability in supporting military operations management.

The purpose of this research is to explore architectures and algorithms for distributed product information. The research claims were be tested by incorporating them into an implemented system called PartNet. This system based on this effort would lead to a scaleable, client/server information system that will enable manufacturers and distributors to make their catalogs available to customers over the Internet. Such a system would allow catalog browsing capability, including multimedia product descriptions with computer aided design (CAD) and other analytical models. It will interface to other systems with EDI or other protocols that support purchase authorization, payment for products and data, order verification, shipment scheduling, and other functions necessary to support the full range of a supplier/customer interaction.

PartNet is able to serve a variety of customer needs. One example would be to aid repair technician in finding a replacement part for a defense system that has no part number available. PartNet would be used to perform dealer identification. Another use would be to aid an engineer in finding information on a component for a system being designed or modified. The engineer would like to know the specifications of the component and what are its dimensions. Working from the desktop, the engineer would find candidate components, compare their specifications and even retrieve CAD models if the supplier has provided them. Supply personnel would use PartNet to perform product and price comparisons and then actually purchase the component through PartNet's link to a purchasing system.

This report tells of the findings of this effort. A detailed explanation of the systems and its workings is included in the research proposal which is included as Appendix A for the reader's convenience.

Research Questions

There are a number of critical research questions that were addressed by this study.

1. Data integration

Is it possible to integrate the data of various vendors in such a way that meaningful product comparisons can be made?

2. Interactivity

Will the Internet support real-time interactive part browsing?

3. Scaleability

Can a federated database scale to the required number of vendors and customers?

4. Data Accuracy

Can the system be made easily updatable so that information providers can easily maintain their own data?

5. Global Consistency

Can the data be made to be globally consistent as new data is added to the system?

6. Caching

To what extent will caching improve system performance? What kind of data should be cached and where should it be cached?

Each of these questions will be addressed individually.

1. Data Integration

Each vendor may have its own manner of describing items which may pose problems when they are compared.

For some items, it is not required that detailed views be maintained and integrated. Some parts only require part number or national stock number be shown. In fact, 80% of all items are bought by national stock number, according to DLA. In those cases, simply having the part number and NSN stored for each item is sufficient. Appendix B shows a PartNet search screen for this type of search and an answer page that showing the parts returned.

For items in which parametric searches are needed, more is required. Sometimes customers do not know the part numbers, instead they wish to

search by the item's characteristic. There are two approaches to satisfying this within PartNet. One method is too create a cross-vendor ontology and coerce the part data into that form. Work done for the Navy on the ITEC Direct site is an example of this approach.

ITEC Direct is a system powered by PartNet that is sponsored by the US Navy. Through this system any DoD staff member can search for and buy computer products. The SPAWAR office that sponsors the program created a list of approved item names and characteristics that each vendor could use to describe its products. The legal values of the products is also defined. As a result, a search by characteristic can be done across vendors. Appendix C shows a sequence of screen shots demonstrating the search process and the resulting answers.

The items for which cross-vendor descriptions are not complete may also be found with a little cleverness on the part of the operator. A user may do a characteristic search on items that have them stored such as those in the Federal Supply System. (Approximately 1 million of those items are currently searchable by parameter.) From that result, one may extract the National Stock Number or part numbers which can then be re-entered as search criteria. That way, every part in the system which matches the parameters is searched upon.

One of the advantages of the PartNet system is that parts may be handled regardless of whether they are part of an integrated taxonomy or not. Many vendors just want to load part numbers and prices initially. As they get more experience with the system and more data is available, more time may be taken to integrate that data in a more tightly bound taxonomy.

2. Interactivity

A critical element of the system's acceptability is the time it takes to respond to user requests. During this study, we quantified and made efforts to reduce user response times. A number of lessons were learned in this experience.

Appendix B records query response times in seconds as seen by users at the Sacramento Air Logistics Center.

The factors that effect performance are:

A. Internet connect speed to backbone of client

Sacramento experienced vastly different response times between their standard milnet connection and a connection to a private Internet Service Provider.

B. Internet connect speed to backbone of server

Performance improved dramatically when PartNet switched Internet Service Providers. PartNet currently uses an ISP with 3 different T3 connections, MCI, Sprint and UUNet.

C. General traffic conditions of backbone

It is well known that the Internet is more congested during certain times of the day than at others. It is also difficult, if not

impossible, to predict the route that an IP packet will follow when traversing from among hosts. This makes transmission time behave as a random variable.

D. Server hardware processing capability

PartNet was able to boost performance significantly by moving the server software to a Sun Enterprise 4000 server. This machine has 2 256 MHz. Processors with 2 gigabytes of memory. This machine was installed in April of 1997.

E. Software Implementation

The most dramatic influence on performance was changes that were made to in the implementation of the databases stored at the VDI's. The searches were improved greatly with the addition of indexing on the part number and NSN number searches. There is a small additional complexity here in that the searches need to be leading edge searches in order to take advantage of the indexing. For instance, a search on part number AB123 should be a "starts with" search where the user enters "AB1" for instance. Users may still to a "contains" search on "B12" but this would not take advantage of the indexing. This type of indexing led to a 100 fold improvement in system performance.

Overall, the performance of the system is acceptable. Although there have been times when it has not been, lessons were learned, changes were installed and the performance improved.

Scaleability

Throughout this effort there has been degradation of performance linked with the number of vendors participating. Problems were discovered when a particular vendor's items grew too large. At about the 2 million items level the performance of the system started to decrease precipitously. The remedy was found in restructuring the implementation at the vendor end. Currently, the system loads configuration files that map databases at the vendor's sites to a central taxonomy. It has been discovered that switching this information into a database would relieve the mapping burden and greatly improve the scaleability of the system. These changes are slated to be made.

Data Accuracy

A primary advantage of the distributed architecture is the accuracy and currency of the data. Part of the effort at SM-ALC was to judge the data accuracy. Occasionally anomalies would appear but there were universally traced back to the source where they had been entered incorrectly. In other words, PartNet always displayed what the source dictated, even if it was incorrect.

Global Consistency

This issue related to the data integration issue which is discussed above. The one addition here is to note that triggers can be applied to the databases to ensure that no bad data gets entered. These rules are

applied to values as they are entered. At that point, they are checked against a list of valid values and an error is generated when appropriate.

Caching

Caching has been tried for various aspects of the system. The criteria for deciding which elements to cache at the NIB are as follows:

a. How volatile is the data?

The more volatile the data, the worse the case for caching.

b. How often will the data be queried?

The more often it's queried, the stronger the case for caching.

c. What are the performance characteristics of the source server?

The better the VDI - vendor database perform, the less need there is for caching.

PartNet has decided that the NSN items are prime targets for caching because it satisfies all the above criteria.

Current Status

Content

PartNet currently has approximately 4 million parts in the system. There are about 8 million more parts being loaded at this point. 80% of these items are from the Federal Supply System. There are about a dozen vendors with data on the system that they maintain.

Format

In the Spring of 1997, a decision was made to abandon the Windows Client and switch entirely to a WWW interface. This has been implemented and currently runs in that mode. There are two web sites that are relevant. One is WWW.VIEW.DLA.MIL. This is the DLA's web site. The other site is ITEC.PART.NET. The latter is the Navy's ITEC site.

Appendix A

Proposal

A Introduction

The management military systems requires access to information that is geographically distributed around the globe. In peacetime or at war, the difficulty in locating that information represents a serious threat to operational success. This proposal is about the acquisition, display, and management of distributed information. Although the focus of the work is on product information, the research done here has broad applicability in supporting military operations management.

The purpose of this research is to explore architectures and algorithms for distributed product information. The research claims will be tested by incorporating them into an implemented system called PartNet. This system based on this effort would lead to a scalable, client/server information system that will enable manufacturers and distributors to make their catalogs available to customers over the Internet. Such a system would allow catalog browsing capability,

including multimedia product descriptions with computer aided design (CAD) and other analytical models. It will interface to other systems with EDI or other protocols that support purchase authorization, payment for products and data, order verification, shipment scheduling, and other functions necessary to support the full range of a supplier/customer interaction.

PartNet could serve a variety of customer needs. One example would be to aid repair technician in finding a replacement part for a defense system that has no part number available. PartNet would be used to perform dealer identification. Another use would be to aid an engineer in finding information on a component for a system being designed or modified. The engineer would like to know the specifications of the component and what are its dimensions. Working from the desktop, the engineer would find candidate components, compare their specifications and even retrieve CAD models if the supplier has provided them. Supply personnel would use PartNet to perform product and price comparisons and then actually purchase the component through PartNet's envisioned link to a purchasing system.

B Research Questions

There are a number of critical research questions that need to be answered to determine whether a distributed system can ameliorate problems associated with product information retrieval.

Data integration Will it be possible to integrate the data of various vendors in such a way that meaningful product comparisons can be made? Work will be required in ontological barriers to meaningful part descriptions.

Interactivity Will the Internet support real-time interactive part browsing? PartNet must be designed with that goal in mind.

Scalability Can a federated database scale to the required number of vendors and customers?

Data Accuracy Can the system be made easily updatable so that information providers can easily maintain their own data?

Global Consistency Can the data be made to be globally consistent as new data is added to the system?

Caching To what extent will caching improve system performance? What kind of data should be cached and where should it be cached?

C Nature and Scope of Research

C.1 Method and Approach

PartNet is a project to provide direct, interactive online access to parts catalogs. This access relies on the Internet network to provide an efficient communications medium for transferring parts information from vendors to customers. This approach has many advantages over either traditional paper catalogs or CD ROM-based methods. Both paper and CD ROM provide a more traditional "batch oriented" style of access to parts data. Normal manufacturing and production delays mean that customers cannot rely on this information to be completely up to date or complete (due to space limitations). Due to the discrete nature of catalogs and ROM discs it is not possible to search all catalogs simultaneously (without the number of disc drives equal to the number of catalogs). It may also not be possible to acquire all catalogs (even from a single catalog distributor) due to shipping or publishing constraints (e.g., a new vendor has been added to our catalog suite, but you cannot get the catalog until our next product release). The PartNet system overcomes these problems by providing immediate access to all vendors simultaneously. All information a vendor is willing to distribute is available including images and animation. When a new vendor joins the PartNet catalog or when an existing vendor adds new products their information is immediately available to customers through the distributed PartNet software system.

The design of PartNet is driven by a small number of important issues. First, it must be scalable to thousands of vendors and tens of thousands of customers. It should be possible to start with an initial installation of a single vendor and a few customers and grow from there. As the subscription rate increases the system should be dynamically configurable to handle the increased load. Second, the system should be tolerant of network failure and processing delays. Since the system relies on databases maintained by vendors at the vendor's site the catalog information will be widely separated both geographically and "network-wise". If answering a query requires all vendor systems to be operational and timely then eventually no query could ever be answered. Finally, the system must be "portable" in the most general sense of the word. Vendor databases all likely run on the full spectrum of computer hardware, use a wide variety of data base management system software (DBMS), and encompass many different data formats. All this diversity must be managed and translated into a unified format suitable for an online parts catalog.

One of the underlying assumptions of PartNet is that many vendors already have or will want

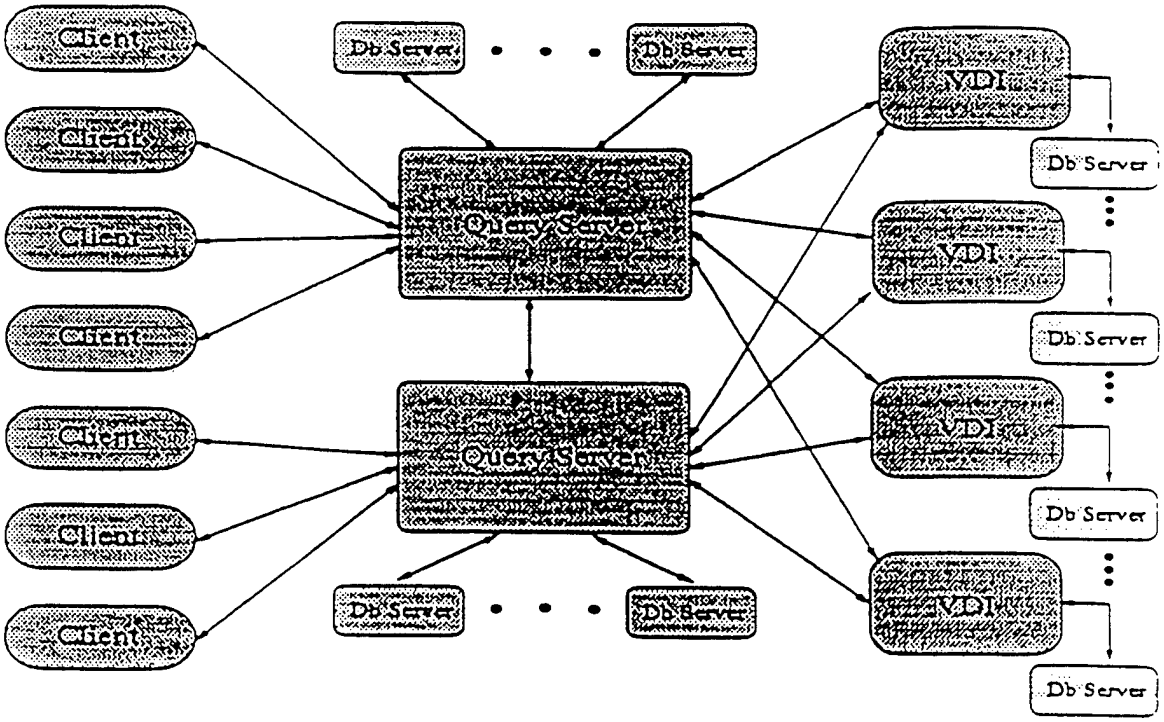

Figure 1: The PartNet process structure.

to store their product information in online databases. The PartNet system is then a matter of exporting this product information in a controlled fashion to the customers who need it. Although this assumption may not reflect current business practice, we feel it is an obvious and economically sound choice. Vendors must already maintain inventory and manufacturing databases; many also have design databases. These can be unified by a comprehensive product database which includes traditional catalog data, availability and delivery information, images, as well as non-traditional data such as animation or vendor tutorials. Information stored in online systems is easier to access, maintain and deliver to end users and will reduce the cost of delivery and dissemination.

C.1.1 The Proposed Architecture

PartNet is designed as a heterogeneous, distributed system system specialized for read-only access. Each vendor site presents a database of parts information available for access by customers. These databases are managed by varying (and possibly proprietary) database management systems. Vendor sites are distributed geographically as well. The common thread which ties these systems together is the Internet network which provides a communications medium and the PartNet software which moderates communication through a common protocol.

The process structure of PartNet is depicted in Figure 1.

Customers interact with the system through a textual or graphical interface which connects to a centralized Query Server (QS). This Query Server receives queries about parts which are then

routed to vendors who supply those parts. Each vendor site provides one or more Vendor Database Interface (VDI) processes which execute the query and return the answer to the QS. The QS in turn forwards the data to the original requesting customer. A single Query Server will handle a hundred or more simultaneous customers. As load increases Query Servers will be replicated.

This process architecture addresses several basic issues inherent to distributed databases. First, the diversity of vendor database software is managed by a single coherent interface exported by the Vendor Database Interface (VDI). Each VDI is responsible for mapping from vendor specific formats into canonical PartNet format. This translation includes DBMS query language, part attribute and value conversion, and image format conversion. The Query Server provides a centralized process for routing queries to vendors, managing global information to avoid inconsistent updates, and caching vendor data to reduce latency. The existence of the Query Server process also dramatically reduces the NxM connectivity problem inherent with allowing customers to talk directly with vendors. Third, the customer-side user interface software is kept simple to allow execution on low-performance, low-capability hardware (e.g., Intel based PCs).

Communication between processes is via a message-based command and response protocol. This allows a simple, portable implementation which is as efficient as Remote Procedure Call systems for average messages, but without the added implementation complexity.

C.1.2 The Vendor Database Interface

PartNet does not impose a particular DBMS or database management paradigm on participating vendors. This is important since vendors may have invested enormous time and expense into building their database. Furthermore, the vendor may even have a proprietary database management system tailored to their specific data. Any attempt to replace this database or impose some standardized format will result in vendors who are unable or unwilling to participate in PartNet.

To avoid excluding vendors by requiring a standard database and query language, PartNet provides an interface process which responds to the PartNet communications protocol and implements database queries through native calls to the vendor database. This interface process manages:

- network communication,
- taxonomy and names,
- concurrency, and
- caching.

We discuss each of these responsibilities in turn.

The first responsibility of the VDI is to manage network communication. Even if a vendor database directly accepted the PartNet command language, additional software would be required to identify

the available Query Servers and manage network connections. When a VDI is initiated it identifies a Query Server through either a well known port and address or using the InterNet name service. After establishing a connection to this Query Server it requests a complete list of active Query Servers with which it should register. By registering with a Query Server the vendor signals its readiness to receive and process queries. VDIs are able to accept connections from new Query Servers as they are added to the network and manage communication from Database Server Processes which are spawned to perform actual database queries.

Once a vendor has registered with a Query Server it transmits a taxonomy describing parts the vendor supplies and their relationship in the taxonomy of known mechanical parts. The Query Server receives this taxonomy and merges it with any existing taxonomy thus incrementally generating a global hierarchy of all parts known to the PartNet system. If the Query Server is presented with an as yet unknown part the VDI may be asked to send a detailed description of the part. This allows new parts to be added by vendors to the PartNet system.

The vendor must also present to the Query Server a list of synonyms used by customers and the Query Server to identify parts and their attributes. For instance, vendors may represent a part number as "PN", "part_number", "part_no", etc. Since the names of mechanical parts and their attributes is not standardized the PartNet system must be prepared to translate part names and attributes from a vendor specific value into a canonicalized form. This canonicalized form is used by the Query Server to uniquely identify parts and attributes and can be used in the customer user interface to simplify part selection and query formulation.

Names passed between the various components of PartNet always use the canonical name. There are two reasons for a VDI to transmit this table (since the Query Server has no use for it):

1. to provide this table to the customer for user interface reasons, and
2. to enable the Query Server to manage distributed updates to the shared synonym table.

If the user interface has this synonym table, customers can select parts using vendor specific nomenclature while still allowing the system to uniquely identify the part. Since the synonym table will be used to map from vendor's names to canonical names collisions must be managed (i.e., prevented or at least identified). This management will require global knowledge of all synonyms and a centralized change control capability (i.e., locking). This is done by the Query Server.

Since a VDI will be connected to several Query Servers which are in turn connected to many customers a vendor may be asked to answer several different queries in a small space of time. Ideally we would like to answer all queries immediately with response time related only to the delay imposed by the vendor's own DBMS. Unfortunately, there may be an arbitrary number of simultaneous queries limited only by the total number of customers. Also, many databases and operating systems are limited in the amount of concurrency a single program can achieve. For instance, a single program executing a database query might be required to wait until that query is processed by the DBMS and the answer returned before being allowed to initiate another query.

This is overcome in the PartNet design by creating several database server processes which execute queries synchronously, but in parallel with each other. These servers are discussed in more detail in Section C.1.3. The VDI process serializes all commands, but since each command can be handled very quickly (i.e., by forwarding the command to a Query Server or a database server) no command is forced to wait an undue amount of time for processing.

The final responsibility of the VDI is to aid in Query Server cache management. To improve throughput and reduce latency the Query Server caches answers to customer queries. The details of this caching are discussed in Sections C.1.4. It is essential that a customer is never given out of date information because the cache is inconsistent with the vendor's actual data. This is the problem of cache consistency and consequently, cache invalidation. To aid in maintaining a consistent cache the VDI must monitor the answers to queries it receives as long as the data is held in a Query Server cache. If this data ever changes the VDI must notify the appropriate Query Server that the original data is now invalid.

C.1.3 The Database Server

The Database Server is a slave process of the VDI and Query Server which performs actual database queries using the native DBMS interface. The purpose of this separate process is to overcome the singly threaded nature of many operating systems and DBMS interfaces. While a single Database Server process may perform one query at a time waiting for DBMS to process the query and return an answer, a collection of Database Server processes can handle multiple queries in parallel. These processes are managed by a single scheduler which maintains a queue of pending queries and a suite of available server processes. Queries are scheduled on idle processors and query answers are delivered using the standard PartNet protocol. It should be emphasized that this does not require a multiprocessor to execute. It is merely a mechanism to achieve process level parallelism in a singly threaded DBMS or operating system.

Although this does not achieve the ideal goal of the fastest query processing possible (which would require a cpu per query), it does provide a reasonable mechanism to maximize throughput and tune query processing. A simple algorithm would allocate a fixed number of Database Servers as determined by past query loads. A more sophisticated algorithm could dynamically adapt to query loads by spawning additional Database Servers as query arrival rate and system load dictate.

C.1.4 The Query Server

The Query Server is the "glue" which binds PartNet together. It provides a centralized service which can be accessed through either a well-known network address or by name from the InterNet name server. Since it is centralized it forms a locus for routing information, global data management, and performance monitoring. We anticipate greater computational power at a Query Server host which can be used to reduce network traffic and latency through caching which may not be possible at the customer site (due to fewer computing resources).

The major responsibilities of the Query Server are:

- manage a set of customers and vendors,
- route messages from customers and vendors,
- control access to global data (taxonomy, parts, synonyms),
- cache data,
- log transactions.

As the central router for messages the Query Server must ensure that each customer is serviced fairly and that no customer process is "orphaned" or "mislead". In particular, answers to customer queries are delivered to the customer incrementally as each vendor supplies their portion of the answer. It is important that the customer not mistake a partial answer for a complete one.

For each query submitted by a customer the Query Server determines which vendor is capable of supplying an answer and forwards the query to that set of capable vendors. This dramatically reduces network traffic when compared with forwarding every query to every vendor. To properly determine the capable vendors the Query Server must know all parts supplied by each vendor and it must update this information as it changes.

Other information the Query Server manages is global data such as the taxonomy, parts list, and synonym table. These items are global in that they unify all information supplied by all vendors with each vendor supplying their portion. A problem arises when two vendors wish to update this global data simultaneously. To properly handle this case some sort of concurrency control is required. PartNet uses an optimistic locking algorithm which allows any vendor to modify global information and request an update at the Server. When the Server receives the update request it determines if the update is valid. If not, the vendor's request is rejected and the vendor must retry the update.

To improve throughput and reduce latency the Query Server caches the answers to previous queries. When a query is received from a customer the cache is first scanned for other queries about the same part requested in the current query. If any are found the cached query is analyzed to determine if the previous query describes a superset of the current query. If this is true the current query can be answered directly from the cache without the overhead of forwarding the query to the vendors.

If a cache is employed the problem of cache consistency and invalidation must be solved. In short, a problem occurs when a vendor updates part information while the Query Server has cached information about that part. In this case the customer may be given out of date information about a part. This problem is solved by requiring the VDI process to inform the query server whenever parts information is changed. To reduce the burden on the VDI and reduce network traffic the Query Server associates a lifetime with each answer. When the lifetime has expired the answer is removed from the cache. This lifetime should be long enough to allow reasonable performance gains while short enough to minimize the load on the network and VDI.

Finally, the Query Server is responsible for monitoring the performance of the PartNet system as a whole. This includes ensuring that vendors and customers are not "orphaned", recording timing statistics on network latency and bandwidth, recording quantity of information delivered by each vendor to each customer (e.g., for billing purposes), and recording general usage patterns. Due to faults in networks and software it may be possible for customers or vendors to become unreachable. This should be noted and should not cause other software (e.g., Query Server or customer interface) to fail. Also, by recording network performance statistics the Query Server can improve the user interface by anticipating delays.

C.1.5 The User Interface

There are a wide variety of user interfaces which we will support. Among these are graphical window-based applications, interactive, but text-based applications, and batch oriented electronic mail interfaces. Such a diverse set of user interfaces is possible because of the simple text command format and the process layering architecture around which PartNet is built.

The Motif PartNet graphical interface, the interactive text interface, and the e-mail interface are all relatively simple. They access the Query Server using the same command language/object set used by the backend processors. For the e-mail interface we assume that users formulate queries with out simplified SQL query language. In this case the receiver strips the mail headers and forwards the query to the Query Server as usual where it is reconstituted into a query object. The interactive interfaces should include support for executing multiple queries simultaneously and managing partial queries.

The other interface discussed is that of the World Wide Web. Here we will extend the Query Server command set to allow the Web to contact the Query Server directly to access the taxonomy and identify vendors. The Web software can then access the vendor catalog directly through a hypertext link.

C.1.6 Methodology

The University of Utah will design and implement the PartNet system which consists of the following subsystems:

1. The Client at a customer site. The customer would be a military installation.
2. A Query Server running on a file server at the University of Utah.
3. A vendor database interface running on a dealer's site.

The University of Utah will brief additional customer sites and install clients at those locations such as the Defense electronics Supply Center and one other site. (Sacramento Air Logistics Center already has client installed.)

C.2 Work Plan

The University of Utah will visit DoD customer sites including the Sacramento Air Logistics Center and the Defense Electronics Supply Center to brief users about PartNet. Contacts will also be made to potential suppliers to recruit them as suppliers of product information.

D Proprietary Claims

The University of Utah claims proprietary rights to any source and object code produced as a byproduct of this proposal. The University of Utah will grant a non-exclusive royalty-free license of this source and object code to the United States Department of Defense and its agencies for their own internal use if this proposal is accepted and funded.

Appendix B

PartNet Screen Shots

DLA EMALL

Shopper's View

Know what you need? Enter one:

NSN	starts wi	5975010921830
Mfg. Part No.	starts wi	
Mfg. Name	starts wi	
Distributor SKU	contains	
	Search	

Want help finding what you need?

Item Name/Nomenclature	
	Search
Or, browse the item directory	

Have a favorite store?

Class	Description	Class	Description
I	Subsistence	VI	Personal Demand Items
II	Clothing/Individual Equipment	VII	
III	Petroleum, Oil, Lubricants	VIII	Medical
IV	Construction Materiel	IX	Repair Parts • Air • Electronics
V	Ammunition	X	???

Need a metal part made?

- On Demand Manufacturing Contracts

User enters an NSN

Query Results

You may narrow your search for items with particular features.

Items 1 - 6

Table of Contents Query Results

Detail Info	Add To Cart		NSN	Mfgr Pt No	Available	Manufacturer
🔍	Add	1	5975010921830	SW25594-1		SYSTEMS AND ELECTRONICS INC
🔍	Add	1	5975010921830	TY-523MX		THOMAS AND BETTS CORP
🔍	Add	1	5975010921830	TY523MX		THOMAS AND BETTS GMBH
🔍	Add	1	5975010921830	91459764		THOMSON-CSF ELEKTRONIK GMBH
🔍	Add	1	5975010921830	91459764		THOMSON-CSF SA
🔍	Add	1	5975010921830	91459764		THOMSON-CSF SA

The first results return.

Shopping Cart

Edit quantity and click 'Update' to recalculate prices.

Quantity	Part Number	Mfgr Pt No	Manufacturer	Unit Price	Extended Price
1		GEM073	SARNOFF DAVID RESEARCH CENTER		
2	09T HEDS-1200	HEDS-1200	HEWLETT-PACKARD	37.17	74.34
10		SW25594-1	SYSTEMS AND ELECTRONICS INC		
Total:					**US$74.34**

Update

nalize Your Ord

Save Your Current Cart

E-Mail Address:	
Shopping Cart Name:	

ave Shopping Car

Retrieve a Shopping Cart

E-Mail Address:	
Shopping Cart Name:	

trieve Shopping Ca

Note: Current shopping cart contents will be replaced.

User adds to shopping cart.

Appendix C

ITEC Direct Screen Shots

- Home
- View Cart
- Feedback

PartNet Powered

PRODUCT CATEGORIES

Use the Power Search or click on a Product Category below:

POWER SEARCH

Attribute	Value
Part Number	
OEM	
Model	
BPA Name	
BPA	
	Submit Search

MONITORS

MODEMS

NETWORK HARDWARE

DESKTOPS
Desktop Tower Systems
Desktop Accessories
Desktop Memory Upgrades
Desktop Multimedia
Desktop Processor Upgrades

NOTEBOOKS
Notebook Accessories
Notebook Memory Upgrades
Notebook Systems
Docking Stations
Notebook Multimedia

SERVERS
Server Accessories
Server Memory Upgrades
Server Processor Upgrades
Server Systems

STORAGE ACCESSORIES
Tape Drives
Data Storage Accessories
Disk Drives

PRINTERS
Ink Bubble Printers
Laser Printers
Printer Accessories
Portable Printers
Dot Matrix Printers

PERIPHERALS
Graphics Upgrades
Input Devices
Scanners
UPS
CD ROM Drives

SOFTWARE
DOS Windows Software
OS2 Software
Unix Software

SUPPORT SERVICES
End User Training
Technical Support
Technical Training
Warranty Maintenance

PORTABLE WORKSTATION
Portable Workstation System
Portable Workstation Accessories
Portable Workstation Memory Upgrades
Portable Workstation CD ROM Drives
Portable Workstation Disk Drives
Portable Workstation Tape Drives
Portable Workstation Input Devices

LOGISTICS LRU

ENTERPRISE SERVERS
Enterprise Server Systems
Enterprise Server Memory Upgrades
Enterprise Server Accessories
Enterprise Server Processor Upgrades

WORKSTATIONS
Workstation Systems
Workstation Processor Upgrades

- Home
- Search by Feature
- Product Categories
- View Cart
- Feedback

PartNet Powered

Displaying results 1 - 42.

To view the detailed information click on the magnifying glass. Click on the add to cart button tc add an item to your shopping cart.

Desktop Tower Systems Search Results

Detail Info	Add To Cart	Description	Price	Part Number	Model	OEM	BPA Nar
		PC 350 Pentium 133, No hard drive, 16 MB EDO System,PCI/ISA, SVGA, No OS	1157	6587-70U	PC Model 350	IBM	McBride TA PC
		4 slots (PCI/ISA), 4 bays, Easy Tools, Intel ProShare, Lotus Smartsuite license.	1344	6560-19T	PC340	IBM	McBride TA PC
		5 slots (PCI/ISA), 5 bays. Must add 6XCD Rom drive and OS(Win95, NT, WARP). No OS-Ready to configure.	1489	6589-10U	PC365	IBM	McBride TA PC
		PC 350 Pent-166 MMX 2.5 GB-HD System, 16MB PCI/ISA SVGA w/WIN95, WIN3.1	1494	6587-KBT	PC Model 350	IBM	McBride TA PC
		IBM PC 350; P166, 16MB memory, 1.6 gb eide disk, 5slogts (pci/isa), 5bays, Windows 95, Easy Tools, Intel ProShare, Lotus Smartsuite license.	1526	6587-9AT	PC Model 350	IBM	McBride TA PC
		4 slots (PCI/ISA), 4 bays, Easy Tools, Intel ProShare, Lotus Smartsuite license.	1569	6560-79T	PC340	IBM	McBride TA PC
		5 slots (PCI/ISA), 5 bays, Easy Tools, Intel ProShare, Lotus Smartsuite license.	1711	6587-7AT	PC350	IBM	McBride TA PC
		PC 365 PPro-S200, No hard drive, 32 MB EDO/DIMM, SVGA, No OS	1783	6589-18U	PC Model 365	IBM	McBride TA PC

Results of a query on tower systems.

		PC 350 Pent-200MMX 2.5 GB-HD 32MB PCI/ISA SVGA w/ WIN95	1901	6587-LBV	PC Model 350	IBM	McBride TA PC
		IBM PC 340: P166, 16MB memory, 1.2GB EIDE disk, 4 slots (PCI/ISA), 4 bays, IBM PCI Ethernet adapter, Windows 95, Easy Tools, Intel ProShare, Lotus Smartsuite license, MS Office Pro.	2079	6560-52U(BUN)	PC Model 340	IBM	McBride TA PC
		BTG PII-233 System with 64MB memory, 3.2GB HDD, 16x CD-ROM, Integrated Sound, Speakers, and 10/100 PCI NIC	1768.56	BMPPIIAUD-S	BTG Pentium II	BTG	BTG CINCLANT IT-21
		BTG PII-266 System with 64MB memory, 3.2GB HDD, 16x CD-ROM, Integrated Sound, Speakers, and 10/100 PCI NIC	1896.56	BMPPIIAUD-T	BTG Pentium II	BTG	BTG CINCLANT IT-21
		Vectra VL PII-233 Mini-Tower System with 64MB memory, 4.0GB HDD, 24x CD-ROM, Integrated Sound, Speakers, and 10/100 PCI NIC	2051.6	D5051N	Vectra VL PII-233	Hewlett Packard	BTG CINCLANT IT-21
		Vectra VL PII-266 Mini-Tower System with 64MB memory, 4.0GB HDD, 24x CD-ROM, Integrated Sound, Speakers, and 10/100 PCI NIC	2169.82	D5044N	Vectra VL PII-266	Hewlett Packard	BTG CINCLANT IT-21
		NEC PII-233 System with 64MB memory, 3.2GB HDD, 16x CD-ROM, Integrated Sound,	2226.91	206-00003	PowerMate Professional MT-233	NEC	BTG CINCLANT IT-21

More tower systems

		Speakers, and 10/100 PCI NIC					
		Compaq DeskPro 4000 Desktop with: 200MHz Pentium Pro CPU, 64MB Memory, 3.2GB Hard Drive, 8x CD-Rom, On-Board Sound w/speakers, Fast Ethernet NIC, Windows NT 4.0	2685.63	247570-002	DeskPro 4000	Compaq	BTG CINCLANT IT-21
		Dimension XPS 200 MMX Minitower,512K cache, Creative Labs AWE32,5.25 PCMCIA card reader, mouse,kybrd,32MB SDRAM, 12-24X CD ROM, 1000 LS Monitor, 4MB PCI STB Virge GX Video Brd, 3.5 FDD, 3.2G HDD, Windows '95, 3 Yr On-Site Warranty	2016	DESKTOP-3	Dimension XPS 200	Dell	DELL TAC
		Integrated 3COM 10/100 network interface card, 256K cache, integrated Creative Labs audio,5.25 PC card reader, mouse,kybrd,64MB EDO/ECC RAM, 10/8X CD ROM, Ultrascan 1000 HS Monitor, 2MB PCI Video Brd,3.5 FDD, 3G HDD, Windows NT4.0, 3 Yr On-Site Warranty	2442	DESKTOP-2	GXiM 200 MMX	Dell	DELL TAC
		Dimension XPS H266 MHz MMX Minitwr,Pentium II, 512K cache, Yahama OPL32 sound card, PCMCIA card reader, mouse,kybrd,64MB SDRAM, 12-24X CD ROM, 1000LS	2584	DESKTOP-4	Dimension XPS H266	Dell	DELL TAC

More tower systems.

		Monitor, 4MB STB Virge GX Video Brd, 3.5 FDD, 3.2G HDD, Windows '95, MS Ofc SBE, 3 Yr On-Site Warranty					
		Pentium 200 MHz MMX, 10/100 Mbs TX NIC, integrated sound, SMART EIDE HD support, 2MB video memory, 2 USB ports, Minitower	2789	DESKTOP-6	Optiplex GXi 200MHz MT	Dell	DELL TAC
		Integrated 3COM 10/100 network interface card, 256K cache, integrated Creative Labs audio,5.25 PC card reader, mouse,kybrd,64MB EDO/ECC RAM, 10/8X CD ROM, Ultrascan 1000 HS Monitor, 2MB PCI Video Brd,3.5 FDD, 3G HDD, Windows NT4.0, 3 Yr On-Site Warranty	2865	DESKTOP-1	6200OP GXPro	Dell	DELL TAC
		Pentium II 266MHz, 512KB cache, integrated 10/100Mbs TX 3COM NIC, integrated sound, 2MB Video, SMART EIDE HD support (ATA-33 HD), dual USB connector, Minitower	3180	DESKTOP-5	Optiplex GXa 266MHz	Dell	DELL TAC
		HP Vectra VL 5, 133MHz, 8 MB RAM, No HDD, 1MB Video RAM	756	D4551A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VL 5 Mini Tower, 133MHz, 16 MB RAM, No HDD, 2MB Video RAM	850	D4571A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VE 3, 166MHz, 16 MB RAM 1.6GB					

More tower systems.

		RAM, 1.0GB HDD, 2MB Video RAM, Windows 95 or Windows for Workgroups.	913	D4093B	VECTRA	HP	GE Capital TAC PC
		HP Vectra VE 3, 133MHz, 16 MB RAM, 1.6GB HDD, 2MB Video RAM, Windows 95 or Windows for Workgroups.	919.01	D4078A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VE 3, 133MHz, 16 MB RAM, 1.0 GB HDD, 2MB Video RAM, Windows 95 or Windows for Workgroups.	927.15	D4075A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VL 5, 133MHz, 16 MB RAM, 2.5GB HDD, 1MB Video RAM, Windows 95 or Windows for Workgroups	1009.68	D4555A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VL 5, 166MHz, 16 MB RAM, 2.5GB HDD, 1MB Video RAM, Windows 95 or Windows for Workgroups	1106.26	D4559A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VL Mini Tower, 166MHz, 16 MB RAM, 2.5GB HDD, 24x CD, Sound Blaster, Plug-n-Play, 2MB Video RAM, Windows 95 or Windows for Workgroups	1115	D5220B	VECTRA	HP	NAVY TAC
		HP Vectra VL 5 Mini Tower, 166MHz, 16 MB RAM, 2.5GB HDD, 8x CD, Sound Blaster, Plug-n-Play, 2MB Video RAM, Windows 95 or Windows for Workgroups	1210	D4579A	VECTRA	HP	GE Capital TAC PC
		HP Vectra VL 5 Mini Tower,					

More tower systems.

		200MHz, 16 MB RAM, 2.5GB HDD, 8x CD, Sound Blaster, Plug-n-Play, 2MB Video RAM, Windows 95 or Windows for Workgroups	1240	D4577A	VECTRA	HP	GE Capital TAC PC
		256KB Cache, 1MB EDO Graphics DRAM	770.27	FR-A71AX-A1	Venturis 5100FX	Digital	DEC TAC I
		1MB EDO Graphics DRAM	814.08	FR-A81AX-A1	Venturis 5100sFX	Digital	DEC TAC I
		1MB EDO Graphics DRAM	831.61	FR-A73AX-A1	Venturis 5133FX	Digital	DEC TAC I
		1MB EDO Graphics DRAM	849.13	FR-A82AX-A1	Venturis 5120sFX	Digital	DEC TAC I
		1MB EDO Graphics DRAM	875.42	FR-A83AX-A1	Venturis 5133sFX	Digital	DEC TAC I
		Venturis FX 5120, 120MHz Pentium, 8MB EDO RAM, 256KB Pipeline Burst-synchronous cache, 1MB EDO graphics DRAM, 1.2GB IDE HDD, Windows 95	945.53	FR-A72AC-AC	Venturis FX Low Profile	DIGITAL	DEC TAC I
		Celebris FX 5133, 133MHz Pentium, Model 1, 16MB EDO RAM, No HDD	989.34	FR-BA0AX-B1	Celebris FX	DIGITAL	DEC TAC I
		Venturis FX 5133, 133MHz Pentium, 16MB EDO RAM, 256KB Pipeline Burst-synchronous cache, 1MB EDO graphics DRAM, 1.2GB IDE HDD, Windows 95	1015.63	FR-A73AC-BC	Venturis FX Low Profile	DIGITAL	DEC TAC I
		1MB EDO Graphics DRAM	1015.63	FR-A75AX-A1	Venturis 5166FX	Digital	DEC TAC I
		Venturis FX 5120, 120MHz Pentium, 16MB EDO RAM, 256KB Pipeline Burst-synchronous cache, 1MB EDO graphics DRAM, 1.2GB IDE HDD, Windows 95	1033.16	FR-A72AC-BC	Venturis FX Low Profile	DIGITAL	DEC TAC I

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PartNet Powered

Product Detail

6587-70U

Pricing

UNIT PRICE
$1157.00

Ordering Information

Add 1 6587-70U to your Shopping Cart.

Component Detail

ATTRIBUTE	VALUE	UNITS
Price	1157	dollars
OEM	IBM	
Model	PC Model 350	
Part Number	6587-70U	
BPA Name	McBride TAC PC	
BPA	N68939-96-A-0007	
GSA	GS-35F-3197D	
Description	PC 350 Pentium 133, No hard drive, 16 MB EDO System,PCI/ISA, SVGA, No OS	
Operating System	NONE.	
Clock Speed	133	MHz
RAM	16	MB
Hard Drive Size	0	MB
CD ROM Speed		
Monitor	NA	
CPU		
PCMCIA Slots		
Pointing Device		
Warranty		
Delivery		
Preinstalled Software		
Cache		KB
Floppy Drive		
Video Memory Size		MB
Sound Type		
Network Card		
Modem		
Data Spec URL		
Image File URL		
Text File URL		
Supplier	McBride	

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SHOPPING CART

STATUS

Shopping cart is currently **editable** -- make changes as needed. Be warned that the "Back" or "Refresh" buttons on your browser may show you an inaccurate shopping cart status.

CONTENTS

To remove an item from your order change the quantity to 0 (zero). If you change the quantity for any item, select the `Update Shopping Cart` button to update the order totals.

BTG CINCLANTFLT IT-21 - N00140-97-A-3688/GS-35F-4036D					
Quantity	**Part Number**	**OEM**	**Model**	**Unit Price**	**Extended Price**
2	BMPPIIAUD-S	BTG	BTG Pentium II	1768.56	3537.12
BPA-Total:					**$3537.12**
Order Total:					**$3537.12**
pdate Shopping Car					

lling and Shippi

SAVE CART

E-Mail Address:	
Shopping Cart Name:	
ave Shopping Car	

RETRIEVE CART

E-Mail Address:	
Shopping Cart Name:	
trieve Shopping Ca	

You must be registered to order through ITEC.

Register Now

For your protection, your APC must confirm authorization prior to your first order.

User adds item to shopping cart.

Appendix D

Usage Data

PART# TEST

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

ERROR MESSAGES: **N** = Unable To Connect to PartNet **NR3** = No Response After 3 mins. **CTO** = Connection Timed Out **NPF** = No Parts Found **NV** = No Vendor Supplies Item **PA** = Parts Avail. **NPA** = No Parts Avail. **AD** = Error: Access Denied **NR** = No Results from Parts Search **ND** = Document Contains No Data **PD** = Proxy Server Down **HTTP-1** = HTTP Proxy Reports: The proxy server has encountered an error (Connection Timed Out) **HTTP-2** = HTTP Proxy Reports: The proxy server has encountered an error (Host is unreachable) **HTTP-3** = HTTP/1.0 Server Too Busy **NOTE:** Recorded times are in seconds unless otherwise noted.

TEST #s	PART.NET			NEWARK			DIGI-KEY			ITEC		
	LOG-IN	SEARCH WINDOW	SEARCH RESULTS	LOG-IN	SEARCH WINDOW	SEARCH RESULTS	LOG-IN	SEARCH WINDOW	SEARCH RESULTS	LOG-IN	SEARCH WINDOW	SEARCH RESULTS
JULY 2, 1010-1025 pst		**(MILNET CONNECTION)**										
2NBS16-5J1-100	22	112	105 - PA	67	14	18 - PA	09	03	02 - NPA	*	*	*
2NBS08-TJ2-102			105 - PA			15 - PA			03 - PA	*	*	*
* Testing on ITEC site has not begun.												
JULY 2, 1054-1055 pst		**(BBN PLANET CONNECTION)**										
2NBS16-5J1-100	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	*	*	*
2NBS08-TJ2-102	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	HTTP-3	*	*	*
* Testing on ITEC site has not begun.												
JULY 2, 1407-1420 pst		**(MILNET CONNECTION)**										
MF-R010	09	17/34	112 - PA	30	20	15 - PA	07	03	03 - NPA	*	*	*
2NSB16-TJ2-103			180 - NPA			13 - NPA			12 - NPA	*	*	*
* Testing on ITEC site has not begun.												
JULY 2, 1054-1055 pst		**(BBN PLANET CONNECTION)**										
MF-R010	01	03/08	NR3	05	08	08 - PA	01	01	02 - NPA	*	*	*
2NSB16-TJ2-103			NR3			06 - NPA			02 - NPA	*	*	*
* Testing on ITEC site has not begun.												
JULY 3, 1044-1056 pst		**(MILNET CONNECTION)**										
CAT16-103J4	16	49/53	33 - NPA	27	13	07 - NPA	12	03	02 - NPA			
4114R-003-181/391			45 - NPA			08 - NPA			02 - NPA			
FR-PCXCR-AN										02	41	31 - PA
FR-PCCAM-BH												22 - PA
JULY 3, 1127-1136 pst		**(BBN PLANET CONNECTION)**										
CAT16-103J4	02	10/17	16 - NPA	05	06	08 - NPA	05	02	02 - NPA			

PART# TEST

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

4114R-003-181/391			10 - NPA			06 - NPA			02 - NPA			
FR-PCXCR-AN										01	NR3	*
FR-PCCAM-BH												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 3, 1303-1316 pst		**(MILNET CONNECTION)**										
MF-R075	12	51/105	16 - PA	16	42	13 - PA	06	03	02 - NPA			
MF-R185			35 - PA			08 - PA			02 - NPA			
FR-PCCAM-AA										05	NR3	*
FR-PCXJD-AB												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 3, 1336-1352 pst		**(BBN PLANET CONNECTION)**										
MF-R075	11	17/28	20 - PA	17	17	10 - PA	04	01	02 - NPA			
MF-R185			10 - PA			09 - PA			02 - NPA			
FR-PCCAM-AA										06	09	16 - PA
FR-PCXJD-AB												10 - PA
JULY 8, 1507-1528 pst		**(MILNET CONNECTION)**										
2NBS16-TJ2-202	11	37/36	140 - NPA	19	15	10 - NPA	12	03	03 - PA			
4610X-101-RC			NR3			26 - NPA			02 - NPA			
FR-PCXCR-AQ										03	NR3	*
FR-A86AC-JE												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 8, 1543-1555 pst		**(BBN PLANET CONNECTION)**										
2NBS16-TJ2-202	04	04/10	118 - NPA	08	10	10 - PA	05	02	02 - PA			
4610X-101-RC			106 - NPA			09 - PA			02 - NPA			
FR-PCXCR-AQ										03	NR3	*
FR-A86AC-JE												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 8, 1600-1615 pst		**(MILNET CONNECTION)**										
MF-R300	16	21/123	105 - PA	12	35	10 - PA	03	03	02 - NPA			
2QSP24-TJ1-100			87 - PA			09 - PA			03 - PA			
FR-AC8AC-BG										05	NR3	*
FR-PC89U-AE												*

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

* No response when trying to reach query window -- unable to continue testing.

JULY 8, 1622-1636 pst		(BBN PLANET CONNECTION)										
MF-R300	02	03/12	NR3	06	15	08 - PA	03	03	02 - NPA			
2QSP24-TJ1-100			NR3			06 - PA			02 - PA			
FR-AC8AC-BG										03	NR3	*
FR-PC89U-AE												*

* No response when trying to reach query window -- unable to continue testing.

JULY 9, 0911-0937 pst		(MILNET CONNECTION)										
2QSP24-TJ1-103	16	19/35	130 - PA	22	25	35 - PA	06	03	03 - PA			
2QSP16-TJ2-102			156 - PA			26 - PA			03 - PA			
FR-PCXCR-AR										06	NR3	*
FR-PCCAM-BB												*

* No response when trying to reach query window -- unable to continue testing.

JULY 9, 1028-1041 pst		(BBN PLANET CONNECTION)										
2QSP24-TJ1-103	02	05/09	105 - PA	59	06	08 - PA	05	02	02 - PA			
2QSP16-TJ2-102			105 - PA			05 - PA			02 - PA			
FR-PCXCR-AR										08	NR3	*
FR-PCCAM-BB												*

* No response when trying to reach query window -- unable to continue testing.

JULY 9, 1521-1530 pst		(BBN PLANET CONNECTION)										
CAT16-331J4	04	08/14	91 - PA	12	06	09 - PA	03	02	02 - NPA			
CAY16-104J4			96 - PA			08 - PA			02 - NPA			
FR-PCVAM-AA										06	16	07 - PA
FR-PCVAM-AB												13 - PA

JULY 9, 1540-1610 pst		(MILNET CONNECTION)										
CAT16-331J4	12	15/23	103 - PA	51	16	12 - PA	13	03	03 - NPA			
CAY16-104J4			80 - PA			11 - PA			03 - NPA			
FR-PCVAM-AA										04	NR3	*
FR-PCVAM-AB												*

* No response when trying to reach query window -- unable to continue testing.

PART# TEST

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

JULY 10, 1031-1048 pst		(MILNET CONNECTION)										
4114R-003-221/331	73	24/57	26 - NPA	100	18	09 - NPA	14	06	06 - NPA			
MF-R090			16 - PA			07 - PA			03 - NPA			
FR-PCCAM-BC										02	NR3	*
FR-PCCAM-BE												*

* No response (NR3) when trying to reach query window -- unable to continue testing.

JULY 10, 1055-1106 pst		(BBN PLANET CONNECTION)										
4114R-003-221/331	04	13/10	16 - NPA	18	16	07 - NPA	02	02	02 - NPA			
MF-R090			09 - PA			06 - PA			02 - NPA			
FR-PCCAM-BC										07	NR3	*
FR-PCCAM-BE												*

* No response when trying to reach query window -- unable to continue testing.

JULY 10, 1328-1344 pst		(MILNET CONNECTION)										
2QSP24-TJ1-471	11	24/11	40 - PA	24	37	09 - PA	09	05	03 - PA			
2QSP16-TJ2-471			26 - PA			15 - PA			06 - PA			
FR-B06AP-BA										11	NR3	*
4A-PCCAM-CA												*

* No response when trying to reach query window -- unable to continue testing.

JULY 10, 1358-1406 pst		(BBN PLANET CONNECTION)										
2QSP24-TJ1-471	09	08/13	11 - PA	07	10	08 - PA	05	02	03 - PA			
2QSP16-TJ2-471			06 - PA			05 - PA			02 - PA			
FR-B06AP-BA										03	NR3	*
4A-PCCAM-CA												*

* No response when trying to reach query window -- unable to continue testing.

JULY 11, 0908-0918 pst		(MILNET CONNECTION)										
CAY16-224J4	03	04/14	11 - PA	09	08	12 - PA	04	02	02 - NPA			
4310R-104-331/391			09 - NPA			14 - NPA			03 - PA			
SN-B37WW-EL										02	NR3	*
54-24556-01												*

* No response (NR3) when trying to reach query window -- unable to continue testing.

JULY 11, 0931-0941 pst	(BBN PLANET CONNECTION)

PART# TEST

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

CAY16-224J4 4310R-104-331/391 SN-B37WW-EL 54-24556-01	04	15/13	17 - PA 08 - NPA	19	38	08 - PA 09 - NPA	11	02	02 - NPA 02 - PA	03	NR3	* *

* No response when trying to reach query window -- unable to continue testing.

JULY 14, 0923-0946 pst		(MILNET CONNECTION)										
2QSP24-TJ1-331 MF-R050 PCXRJ-AD FR-PCSRA-RN	07	18/37	NR3 NR3	49	23	11 - PA 53 - PA	04	03	05 - PA 03 - NPA	22	NR3	* *

* No response when trying to reach query window -- unable to continue testing.

JULY 14, 1009-1021 pst		(BBN PLANET CONNECTION)										
2QSP24-TJ1-331 MF-R050 PCXRJ-AD FR-PCSRA-RN	10	13/20	120 - PA 111 - PA	34	17	09 - PA 05 - PA	13	03	02 - PA 02 - NPA	11	28	07 - PA 07 - PA

JULY 14, 1219-1238 pst		(MILNET CONNECTION)										
MF-R800 MF-R700 FR-PC88U-AB FR-PC88U-AF	06	27/40	NR3 **	71	37	08 - PA 07 - PA	04	06	04 - NPA 08 - NPA	20	NR3	* *

* No response (NR3) when trying to reach query window -- unable to continue testing.
** Error Msg: "Internet Explorer cannot open the Internet site https://ww.part.net/cgi-bin/partnet/AnswerSrc. The Operation Timed Out."

JULY 14, 1258-1311 pst		(BBN PLANET CONNECTION)										
MF-R800 MF-R700 FR-PC88U-AB FR-PC88U-AF	07	08/14	111 - PA 118 - PA	22	17	12 - PA 08 - PA	03	03	02 - NPA 02 - NPA	11	NR3	* *

* No response when trying to reach query window -- unable to continue testing.

JULY 15, 0956-1022 pst		(MILNET CONNECTION)										
MF-R110 CAT16-472J4	07	52/65	20 - PA 25 - PA	36	18	24 - PA 14 - PA	15	03	03 - NPA 03 - NPA			

PART# TEST

Provided by Lisa Stenhouse-Gaskin
McClellan AFB (916) 643-2991

SN-VRC21-WA										06	NR3	*
SN-VRCX1-W3												*

* No response when trying to reach query window -- unable to continue testing.

JULY 15, 1036-1044 pst	(BBN PLANET CONNECTION)											
MF-R110	08	06/21	13 - PA	24	14	10 - PA	03	06	03 - NPA			
CAT16-472J4			20 - PA			07 - PA			02 - NPA			
SN-VRC21-WA										05	NR3	*
SN-VRCX1-W3												*

JULY 15, 1319-1335 pst	(MILNET CONNECTION)											
2QSP16-TJ2-681	03	29/NR3	*	02	**	*	01	***	*			
2QSP16-TJ2-271			*			*			*			
FR-PC77M-AJ										02	156	43 - PA
FR-PC77M-AK												15 - PA

* Unable to reach partsearch window - unable to continue testing
** Error Msg: "Internet Explorer cannot open the Internet site https://ww.part.net/cgi-bin/newark/TocSrc?guest=1&cst=nk. The Operation Timed Out."
*** Error Msg: "Internet Explorer cannot open the Internet site http://www.digikey.com/DigiKeySearch.html. The Operation Timed Out."

JULY 15, 1345-1357 pst	(BBN PLANET CONNECTION)											
2QSP16-TJ2-681	08	18/75	10 - PA	20	37	17 - PA	04	03	03 - PA			
2QSP16-TJ2-271			11 - PA			10 - PA			03 - PA			
FR-PC77M-AJ										09	NR3	*
FR-PC77M-AK												*

* No response when trying to reach query window -- unable to continue testing.

JULY 16, 0915-0929 pst	(MILNET CONNECTION)											
76H102	06	28/41	30 - PA	19	69	15 - PA	04	05	03 - NPA			
76H202			26 - PA			13 - PA			03 - NPA			
FM-DSKTR-AB										12	NR3	*
FM-PC2HR-12												*

* No response when trying to reach query window -- unable to continue testing.

JULY 16, 1241-1254 pst	(MILNET CONNECTION)											
76W101	08	14/29	26 - PA	34	120	16 - PA	10	10	04 - NPA			
76W501			43 - PA			15 - PA			03 - NPA			
FM-PCXHW-36										21	NR3	*

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FM-DSKTD-1G												*
* Unable to reach partsearch window - unable to continue testing												
NO TESTING COMPLETED USING BBN PLANET CONNECTION ON 7/16/97.												
JULY 17, 0959-1013 pst		**(MILNET CONNECTION)**										
70Y201	22	128/51	27 - PA	80	31	17 - PA	06	06	05 - NPA			
70Y203			21 - PA			12 - PA			04 - NPA			
FM-DSKMF-03										20	NR3	*
FM-DSKPC-31												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 17, 1102-1109 pst		**(BBN PLANET CONNECTION)**										
70Y201	02	03/09	07 - PA	05	06	07 - PA	02	02	02 - NPA			
70Y203			07 - PA			04 - PA			02 - NPA			
FM-DSKMF-03										04	NR3	*
FM-DSKPC-31												*
JULY 17, 1243-1256 pst		**(MILNET CONNECTION)**										
76P202	19	13/51	42 - PA	56	13	11 - PA	19	09	05 - NPA			
76W503			17 - PA			23 - PA			03 - NPA			
QS-TC1A9-CH										11	NR3	*
QB-0QRAA-SB												*
* Unable to reach partsearch window - unable to continue testing												
JULY 17, 1301-1307 pst		**(BBN PLANET CONNECTION)**										
76P202	02	03/10	08 - PA	04	07	06 - PA	03	02	05 - PA			
76W503			09 - PA			06 - PA			02 - PA			
QS-TC1A9-CH										06	NR3	*
QB-0QRAA-SB												*
* No response when trying to reach query window -- unable to continue testing.												
JULY 18, 0905-0917 pst		**(MILNET CONNECTION)**										
74P-102	10	14/23	17 - PA	30	07	12 - PA	04	03	02 - NPA			
74P-503			10 - PA			10 - PA			02 - NPA			
FR-SWXRA-Z2										13	NR3	*

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SN-PCXRA-AN												*

* No response when trying to reach query window -- unable to continue testing.

JULY 18, 0955-1006 pst		(BBN PLANET CONNECTION)									
74P-102	04	12/60	11 - PA	31	08	10 - PA	03	03	02 - NPA		
74P-503			09 - PA			12 - PA			02 - NPA		
FR-SWXRA-Z2										12	NR3	*
SN-PCXRA-AN												*

JULY 18, 1309-1325 pst		(MILNET CONNECTION)									
76P203	06	17/136	21 - PA	150	98	15 - PA	05	04	09 - NPA		
76W205			22 - PA			11 - PA			03 - NPA		
SN-PBXGC-BN										11	NR3	*
SN-PCCAG-AA												*

* Unable to reach partsearch window - unable to continue testing

JULY 18, 1358-1404 pst		(BBN PLANET CONNECTION)									
76P203	02	03/12	10 - PA	04	07	06 - PA	03	02	02 - NPA		
76W205			08 - PA			07 - PA			02 - NPA		
SN-PBXGC-BN										04	NR3	*
SN-PCCAG-AA												*

* No response when trying to reach query window -- unable to continue testing.

JULY 21, 0933-0954 pst		(MILNET CONNECTION)									
111-202CAK-B01	03	65/100	64 - PA	28	28	11 - PA	04	05	03 - NPA		
111-202CAK-H01			60 - PA			46 - NPA			03 - NPA		
29-31704-01										15	NR3	*
30-43120-01												*

* No response when trying to reach query window -- unable to continue testing.

JULY 21, 1609-1625 pst		(MILNET CONNECTION)									
76P203	20	10/36	162 - PA	29	23	16 - PA	03	03	03 - NPA		
76W205			NR3			12 - PA			03 - NPA		
SN-PBXGC-BN										03	34	18 - NPA
SN-PCCAG-AA												24 - NPA

* Unable to reach partsearch window - unable to continue testing

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NO TESTING COMPLETED USING BBN PLANET CONNECTION ON 7/21/97.

JULY 22, 1345-1400 pst (MILNET CONNECTION)

120-103FAJ-Q01	17	21/38	NR3	26	18	12 - PA	05	08	03 - NPA			
121-504NAJ-Q01			NR3			45 - PA			03 - NPA			
FR-PCSRB-AF										02	NR3	*
FR-PCSRB-AV												*

* No response when trying to reach query window -- unable to continue testing.
Note: Testing for ITEC via NT 4.0 was successful -- 128 seconds to reach part search window, search results under 30 seconds.

JULY 22, 1410-1415 pst (BBN PLANET CONNECTION)

120-103FAJ-Q01	*	*	*	*	*	*	*	*	*			
121-504NAJ-Q01			*			*			*			
FR-PCSRB-AF										*	*	*
FR-PCSRB-AV												*

* Error Msg: "HTTP/1.0 Server Too Busy" -- unable to test any sites.

JULY 22, 1530-1531 pst (BBN PLANET CONNECTION)

135-503LFW-J01	*	*	*	*	*	*	*	*	*			
143-503QAG-RC1			*			*			*			
FR-880WW-AE										*	*	*
FR-890WW-AB												*

* Error Msg: "HTTP/1.0 Server Too Busy" -- unable to test any sites.

JULY 22, 1535-1546 pst (MILNET CONNECTION)

135-503LFW-J01	15	16/31	NR3	15	25	16 - PA	07	03	03 - NPA			
143-503QAG-RC1			NR3			12 - PA			05 - NPA			
FR-880WW-AE										06	NR3	*
FR-890WW-AB												*

* Unable to reach partsearch window - unable to continue testing
Note: Testing for ITEC via NT 4.0 was successful @ ITEC part search page -- 35 seconds to reach part search window, search results under 30 seconds.

JULY 23, 1402-1418 pst (MILNET CONNECTION)

192-302LEW-A01	11	22/34	NR3	34	35	19 - PA	12	06	03 - NPA			
192-502LEW-A01			NR3			20 - NPA			03 - NPA			

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FM-ESP1A-A FM-PMS65-A										02	86	104 - PA 18 - PA
JULY 23, 1427-1448 pst		**(BBN PLANET CONNECTION)**										
192-302LEW-A01 192-502LEW-A01 FM-ESP1A-A FM-PMS65-A	05	04/14	111 - PA 139 - PA	10	15	20 - PA 25 - PA	02	02	05 - NPA 03 - NPA	08	NR3	* *
JULY 23, 1521-1539 pst		**(MILNET CONNECTION)**										
197-102DAG-A01 197-220LAG-A01 FR-974WW-XD FR-B41WW-AC	06	13/51	NR3 NR3	26	25	11 - PA 15 - NPA	05	05	02 - NPA 04 - NPA	03	115	26 - NPA 17 - NPA
JULY 23, 1611-1625 pst		**(BBN PLANET CONNECTION)**										
197-102DAG-A01 197-220LAG-A01 FR-974WW-XD FR-B41WW-AC	05	03/17	NR3 176 - NPA	14	11	12 - PA 07 - NPA	04	03	02 - NPA 02 - NPA	09	NR3	* *
JULY 24, 0924-0938 pst		**(MILNET CONNECTION)**										
197-104QAG-A01 197-303KAG-A01 FR-PCXVR-AY FR-CDCAA-BA	17	26/40	NR3 NR3	35	41	13 - PA 23 - PA	12	08	05 - NPA 04 - NPA	07	NR3	* *
Note: Testing for ITEC via NT 4.0 was unsuccessful @ ITEC part search page -- timed out after 3 minutes (NR3).												
JULY 24, 1526-1541 pst		**(MILNET CONNECTION)**										
140-501FAG-RB1 140-102FAG-RB1 FR-972WW-XA FR-A61WW-AA	07	10/45	NR3 NR3	15	33	33 - PA 11 - PA	05	09	03 - NPA 03 - NPA	10	125	39 - PA 18 - PA
NO TESTING COMPLETED USING BBN PLANET CONNECTION ON 7/24/97.												
JULY 25, 1332-1347 pst		**(MILNET CONNECTION)**										
C300KR10	17	61/120	NR3	02	60	10 - PA	02	11	04 - NPA			

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C300KR40			NR3			08 - PA			12 - NPA			
FM-DSKHD-2G										03	NR3	*
FM-DSKLC-C1												*

Note: Testing for ITEC via NT 4.0 was unsuccessful @ ITEC part search page -- timed out after 3 minutes (NR3).

JULY 25, 1442-1503 pst		(MILNET CONNECTION)										
E300KR10	15	24/73	146 - PA	123	96	15 - PA	05	03	03 - NPA			
E300K2R5			168 - PA			26 - PA			04 - NPA			
QR-SMPR0-AK										05	146	72 - NPA
QR-SMPR0-AN												65 - NP

NO TESTING COMPLETED USING BBN PLANET CONNECTION ON 7/25/97.

JULY 30, 0948-0953 pst		(BBN PLANET CONNECTION)										
L100J1R0	07	*	**	14	12	11 - PA	03	04	02 - PA			
L100J10R			**			07 - PA			04 - PA			

* Error Msg: "Internet Explorer cannot open the Internet site https://www.part.net/cgi-bin/partnet/LoginDoc?frames=0.
A connection with the server could not be established."
** Unable to test because connection with server could not be established.

JULY 30, 1025-1042 pst		(MILNET CONNECTION)										
L100J1R0	09	20/47	NR3	31	25	17 - PA	25	03	05 - PA			
L100J10R			NR3			11 - PA			06 - PA			

JULY 30, 1404-1416 pst		(MILNET CONNECTION)										
L225J4R0	15	29/27	NR3	23	26	14 - PA	14	07	04 - NPA			
L225J150			NR3			12 - PA			03 - NPA			

JULY 30, 1429-1445 pst		(BBN PLANET CONNECTION)										
L225J4R0	06	*	**	18	15	13 - PA	03	02	02 - NPA			
L225J150			**			10 - PA			02 - NPA			

* Error Msg: "Internet Explorer cannot open the Internet site https://www.part.net/cgi-bin/partnet/LoginDoc?frames=0.
A connection with the server could not be established."
** Unable to test because connection with server could not be established.

JULY 31, 0917-0927 pst		(MILNET CONNECTION)										

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L225J3K0	**	**	**	*	*	*	04	19	03 - NPA			
L225J30K			**			*			05 - NPA			

* Error Msg: "Internet Explorer cannot open the Internet site http://www.newark.com/
The operation timed out."
** Error Msg: "Internet Explorer cannot open the Internet site http://part.net/
The operation timed out."

JULY 31, 1008-1018 pst		(BBN PLANET CONNECTION)										
L225J3K0	17	05/13	NR3	21	12	11 - PA	03	02	02 - NPA			
L225J30K			180 - PA			06 - PA			02 - NPA			

JULY 31, 1025-1030 pst		(MILNET CONNECTION)										
L50J100K	**	**	**	*	*	*	12	23	04 - NPA			
L50J250K			**			*			03 - NPA			

* Error Msg: "Internet Explorer cannot open the Internet site http://www.newark.com/
The operation timed out."
** Error Msg: "Internet Explorer cannot open the Internet site http://part.net/
The operation timed out."

JULY 31, 1057-1103 pst		(BBN PLANET CONNECTION)										
L50J100K	05	03	**	13	*	*	NR3					
L50J250K			**			*						

AUGUST 04, 1058-1109 pst		(MILNET CONNECTION)										
MP06A10	35	27/99	23 - NPA	77	87	16 - NPA	11	05	03 - NPA			
MP06A75			18 - NPA			19 - NPA			03 - NPA			

AUGUST 04, 1121-1128 pst		(BBN PLANET CONNECTION)										
MP06A10	12	08/16	08 - NPA	16	15	10 - NPA	03	02	02 - NPA			
MP06A75			08 - NPA			06 - NPA			02 - NPA			

AUGUST 04, 1137-1145 pst		(BBN PLANET CONNECTION)										
MP25A1	07	03/18	09 - PA	37	25	10 - PA	03	03	02 - NPA			
MP25A2			09 - PA			07 - PA			02 - NPA			

AUGUST 04, 1151-1205 pst		(MILNET CONNECTION)										
MP25A1	07	37/41	147 - PA	51	*	*	08	04	03 - NPA			
MP25A2			140 - PA			*			03 - NPA			

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* Error Msg: "An unexpected error occurred while accessing the online catalog as a guest user" -- unable to continue testing.

AUGUST 05, 1034-1037 pst		**(MILNET CONNECTION)**										
HLW-12-A1Z	02	05/11	10 - PA	07	09	09 - PA	08	03	02 - NPA			
HLW-6-A1Z			12 - PA			10 - PA			02 - NPA			
AUGUST 05, 1043-1047 pst		**(BBN PLANET CONNECTION)**										
HLW-12-A1Z	05	07/11	13 - PA	19	14	13 - PA	05	03	02 - NPA			
HLW-6-A1Z			08 - PA			08 - PA			02 - NPA			
AUGUST 05, 1611-1615 pst		**(MILNET CONNECTION)**										
HLW-20-A1Z	03	04/25	18 - PA	22	10	16 - PA	03	02	02 - NPA			
CW-2B			20 - PA			14 - PA			02 - NPA			
AUGUST 05, 1621-1624 pst		**(BBN PLANET CONNECTION)**										
HLW-20-A1Z	03	04/12	11 - PA	06	08	10 - PA	03	03	02 - NPA			
CW-2B			11 - PA			07 - PA			02 - NPA			