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INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume IV - IISS System
Part 4 - System Integration Test

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This document describes the system test tool that is used to demonstrate an application executing within the IISS environment. This tool also is used as a system integration testing tool.

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FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.

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Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface,and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

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SECTION 1

INTRODUCTION

This document is a comprehensive package to demonstrate an application executing in the IISS environment.

This demonstration uses all four subsystems of the IISS, namely, Common Data Model (CDM), User Interface and Virtual Terminal Interface (UI/VTI), Network Transaction Manager (NTM) and the Communication (Comm) Subsystem. The application is written using the UI/VTI application definition language, and COBOL and accesses the CDM data dictionary to retrieve information about the databases and where the data resides and processes distributed queries using the NTM and COMM.

At any one stage during the demonstration, an application may be accessing up to three databases on three different DBMS and processing data retrieved across two computers - IBM and VAX.

Section 2 provides the demonstrator with a background of IISS. Section 3 sets the stage for the demonstration. This section contains information about the data definition phase and the precompilation or data manipulation phase. Section 4 provides details for each application with screen layouts and the semantics of each application. Section 5 is a summary of "Why to use IISS."

The appendices provide the CDMA with enough information to build the environment for this demonstration.

SECTION 2

IISS OVERVIEW

This section provides the demonstrator with a history of IISS and a brief introduction to the IISS concepts.

IISS is one of the original CIM programs to design and develop integration methodologies and to support technology transfer to industry as well as to other ICAM programs such as the Integrated Sheet Metal Center. IISS has also embodied development from other CIM programs such as the ICAM Definition Methodology, or IDEF.

Currently, IISS work is being continued under the DAPRO (Data Automation Processor) Program.

Control Data is the prime contractor for DAPRO with Structural Dynamics Research Corporation (SDRC) as a main development subcontractor.

In most factories today, there are different kinds of computers being used, providing different kinds of independent functions such as scheduling, process planning, engineering analysis, and shop floor control. These computer systems very often contain the same or related data, but no standard technique exists for tying them together. This is the heterogeneous environment for which IISS is being developed.

IISS's approach to solving the problem is through a Test Bed technology designed to integrate all the various functions into one information base.

This approach is an evolutionary one, which answers:

INFORMATION PROBLEMS of

- o shareability
- o ease of use
- o communication among computers

and

INFORMATION QUESTIONS of

- o where is the data?
- o how is it stored?
- o how can it be controlled?

IISS has developed an integration concept that allows:

- o data to be stored in a single information base
- o all terminals to function as a single terminal
- o all computers to look like a single computer

This integration concept makes the

- o MULTI COMPUTER
- o MULTI DATABASE
- o MULTI TERMINAL

environment "APPEAR" to be a single integrated system.

The key to this system is that all of the computers "appear" to be a single large computer with a single consistent type of terminal interface to the users of the system, and all of the data "appearing" to be stored in one enterprise database. The key, again, is in "appearance" to the user because nothing is actually physically moved.

The IISS environment consists of 4 (four) subsystems which encompass the integration concepts of:

- o SYSTEM INTEGRATION
- o DATA INTEGRATION
- o USER INTERFACE INTEGRATION

System integration is provided through the COMM and the NTM subsystems.

The COMM subsystem allows computers to communicate with one another, providing hardware integration. A local area network is used to provide this physical connection between the computers. A software communications protocol is provided on each computer; this is the language that allows computers to understand one another.

The NTM provides the connection between all of the subsystems and the application processes. The NTM is also responsible for start-up and shut-down services, system operation, and managing message traffic in the IISS environment. It is the operating system of IISS.

Data Integration is provided through the Common Data Model (CDM) Subsystem.

This subsystem uses the IDEF integration methodology to model the enterprise. This methodology uses the three schema architecture to provide an integrated view of the information in the enterprise. The CDM contains the information about WHERE and HOW the data is stored. Data Integration is also provided through the Neutral Data Manipulation Language and the Common Data Model Processors which perform data transforms between the three schemas.

User Interface Integration is provided through the UI/VTI subsystem.

This subsystem allows a user to use any terminal to access any application regardless of the computer on which it resides and which terminal it is targeted for. The terminal hardware characteristics are made transparent to the programs in the computer by translating them to a neutral format. This provides hardware independence. The VTI is connected to a

forms package that provides formatted screens (for output display and data input), which interfaces to the application programs. This provides a consistent interface to the user as well as being easy for both the programmer and the end user to understand and use.

Have you ever needed to obtain information that is stored in different places or different databases? How difficult was this to accomplish? Very difficult, if you had to access several different computers and correlate the data from each to get the information. This is known as a distributed query. In the manufacturing world of heterogeneous computers and databases, which is typical in the aerospace environment, distributed queries are very time consuming to perform and require much manual effort. With IISS, a single request can be made for all of the data and the answer is provided automatically.

With this overview, let us continue with a demonstration of an application utilizing all components of the IISS environment. This application is running on VAX using a TEK 4XX terminal and will at times be accessing three databases, Oracle, VAX-11 and DB2, and two computers, IBM and VAX, to obtain the results.

SECTION 3

DEMONSTRATION SCENARIO

This demonstration uses a Conceptual Schema (CS) of eleven entities. The CS has been mapped to three databases. They are as follows: one ORACLE Database on the VAX, one VAX-11 Codasyl Database on the VAX and one DB2 Database on the IBM. The Schemas and Interschema mappings have been defined to the CDM using the Neutral Data Definition Language (NDDL).

The application consists of eight (8) tasks which have been written using an Application Definition Language (ADL) and a COBOL subroutine. Both the ADL and the COBOL have Neutral Data Manipulation Language (NDML) statements embedded in them.

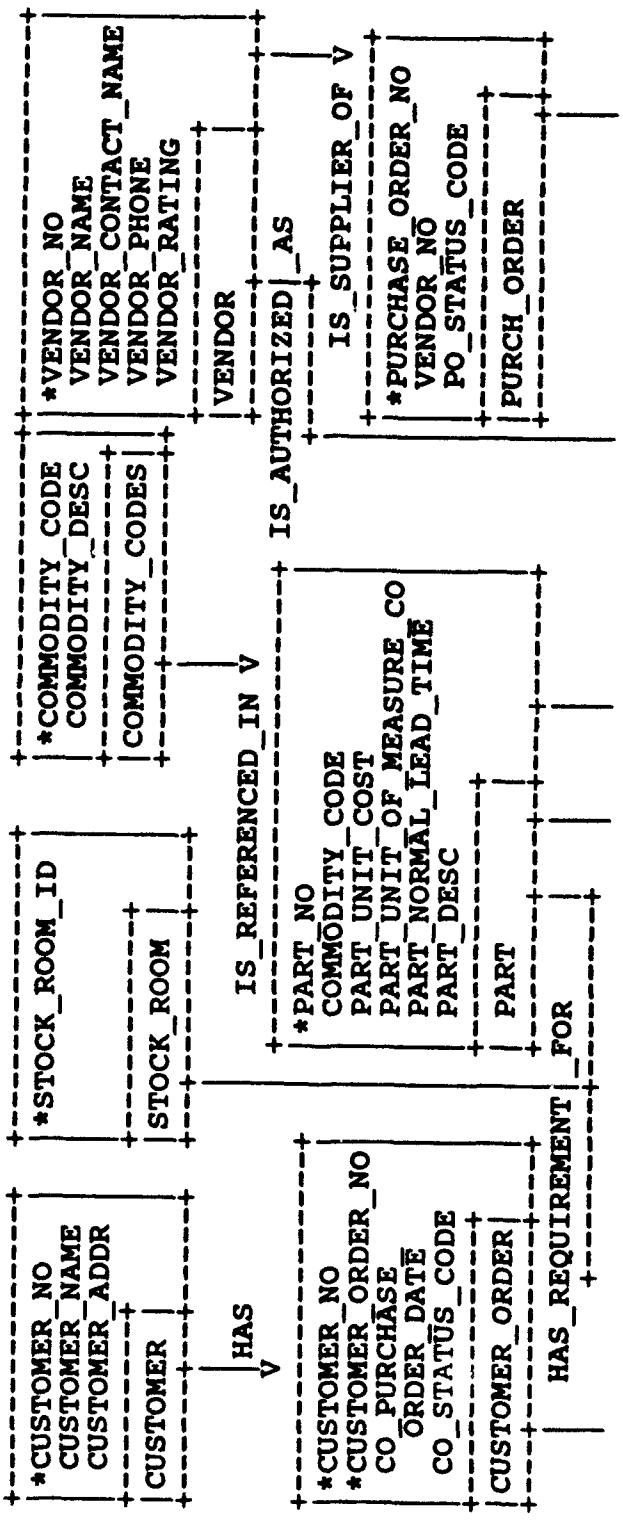
The IISS Demo environment can be created by following the steps listed in Appendix A and B. Since the CDMA or the I & T team will be creating the environment, familiarity with the nodes VAX and IBM, the DBMS ORACLE, VAX-11 and DB2, and the CDM, UI and NTM Subsystem is assumed.

The application is written against External Schema views and needs to be precompiled. The user writes applications against a view because he/she needs no prior knowledge of where the data is resident i.e., on which host computer or on which DBMS. The precompiler performs a translation between the three Schemas. It translates the neutral NDML request into DBMS specific calls. In our scenario, this implies that programs are generated that access Oracle, VAX-11 and DB2 Databases.

The NTM and COMM provide the communication between the two nodes in our scenario, IBM and VAX.

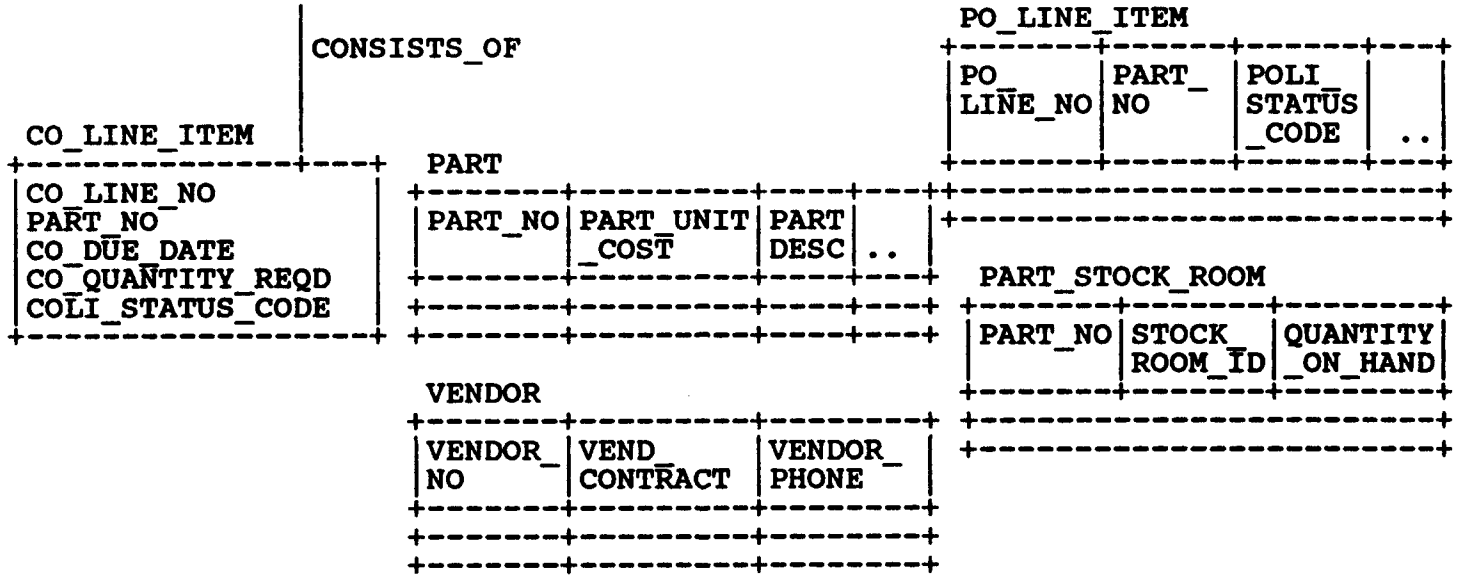
The Conceptual Schema, Internal Schema, and a mapping example for the IISS Demo follow:

CONCEPTUAL SCHEMA

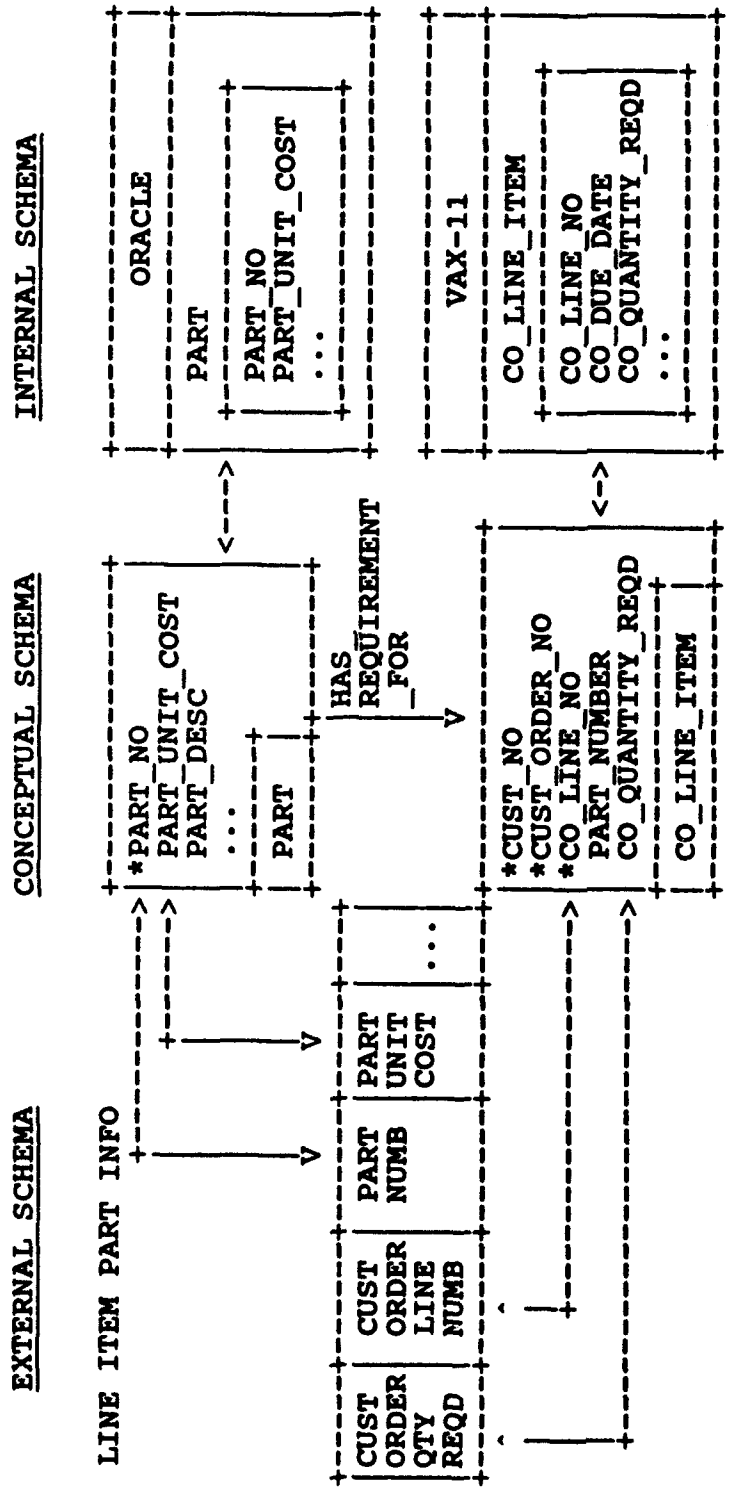


CONSISTS_OF
CONSISTS_OF
STOCKS
IS_STORED_IN
IS PURCHASED_FROM
IS RE-SUPPLIED_BY
*CUSTOMER_NO
*CUSTOMER_ORDER_NO
CO_LINE_NO
PART_NO
CO_DUE_DATE
CO_QUANTITY_REQUIRED
COLI_STATUS_CODE
CO_LINE_ITEM
*PART_NO
*STOCK_ROOM_ID
QUANTITY_ON_HAND
PART_STOCK_ROOM
*PART_NO
*VENDOR_NO
PART_VENDOR
*VENDOR_NO
*PURCHASE_ORDER_NO
*PO_LINE_NO
PART_NO
PO_DUE_DATE
PO_QUANTITY_REQUIRED
POLI_STATUS_CODE
PO_LINE_ITEM

INTERNAL SCHEMA


CONSISTS_OF
CO_LINE_ITEM
CO_LINE_NO
PART_NO
CO_DUE_DATE
CO_QUANTITY_REQD
COLI_STATUS_CODE
PART
PART_NO
PART_UNIT_COST
PART DESC
..
VENDOR
VENDOR_NO
VEND_CONTRACT
VENDOR_PHONE
PO_LINE_ITEM
PO_LINE_NO
PART_NO
POLI_STATUS_CODE
..
PART_STOCK_ROOM
PART_NO
STOCK_ROOM_ID
QUANTITY_ON_HAND

A MAPPING EXAMPLE



SECTION 4

THE DEMONSTRATION

Welcome to a demonstration of an application using all components of IISS.

An ORACLE, NTM and UI environment must be established as detailed in Appendices A and B.

The demonstration may run in black and white from a VT terminal, or it may be run in color from a TEK terminal.

At the VAX ($) prompt, type:

VT100 (if VT terminal)

or

TEK4100 (if TEK terminal)

At the UIMS screen, type:

User: IISSDEMO
Password: IISSDEMO
Role: IISSDEMO

At the function screen, type:

Function: IISSDEMO

A menu screen appears. Eight applications will be demonstrated in order, listing the screen visuals, purpose of the application, features being demonstrated, and databases accessed.

Here we go... Please follow along...

INTEGRATED INFORMATION SUPPORT SYSTEM DEMO

Prepared By

CONTROL DATA CORPORATION

STRUCTURAL DYNAMICS RESEARCH CORPORATION

MSG: 1 Press <ENTER> to begin demo, <QUIT> to end applcation

This is the first screen
Press <ENTER>
As a rule of thumb, <ENTER> or <PF5> start up most applications. <PF4> takes you back 1 level and <PF16> takes you back to the main menu. Tasks can be exited using successive <PF4>s or using a single <PF16>.

```
Next Task: REVIEWCO    MAINMENU
Date: 2/24/88
Press <PF7> for Keypad Help

                MAIN MENU

Customer Order Information
   REVIEWCO  (Review Open Customer Orders)

Inventory Information
   ADDPART   (Assign New Part to Stock Room(s) )
   INVENTORY (Stock Room Inventory)
   DELPART   (Delete Part From Stock Room)

Purchasing Information
   ADDVENDOR (Insert a New Vendor)
   SUPPLIERS (Determine Suppliers)
   UPDATEPO  (Update Open Purchase Orders)
   LISTPO    (List Purchase Order Information)


MSG: _1 Enter task keyword and press <ENTER>    applcation
```

The first task selected, REVIEWCO, reviews "open" customer orders. An "open" order is one that has any line item due within a specified time frame, and the line item status is "active" ("AC").

Press <PF7> to familiarize yourself with the keypad.

```
  Next Task: _____  REVIEW OPEN CUSTOMER ORDERS
Date:  2/24/88
  Press <PF7> for Keypad Help

                    TIME FRAME:  From 01-JAN-00 To 31-DEC-99


MSG: _1 Enter time-frame (DD-MMM-YY), press <QUERY> for open
orders applcation
```

Insert a time frame so that we can view open orders. If no time frame is inserted, the default values are assumed as is the case for this demonstration. Press <Query>

Next Task: _____ OPEN CUSTOMER ORDERS Date: 2/24/88
Press <PF7> for Keypad Help

TIME FRAME: From 01-JAN-00 To 31-DEC-99

Customer Name	Order Number	Date Placed
DELTA AIRLINES	4009	20-JUL-87
NORTHWEST AIRLINES	4010	03-AUG-87
US AIR FORCE	4002	03-AUG-87
US AIR FORCE	4003	25-MAY-87
US AIR FORCE	4004	06-JUL-87
US NAVY	4005	20-JUL-87
US NAVY	4006	27-JUL-87

Position cursor on order#, press <QUERY> for order information

MSG: 1 Open Orders Retrieved - Press <CONT> for more applcation

This query accessed a VAX-11 database on the VAX and traverses sets to obtain open customer orders.
Now, if I want to find out more about customer order number 4002, tab down to order-number 4002 and press <Query>.

Next Task: _____ CUSTOMER ORDER INFORMATION Date: 2/24/88
Press <PF7> for Keypad Help

Customer Name: US AIR FORCE
Order Number : 4002
Date Placed : 03-AUG-87

Line Item	Part Number	Quantity Required	Due Date	Status
001	12347	100.00	17-AUG-87	AC

Position cursor on part number and press <HELP> for part information

MSG: _1 Press <QUIT> to return to previous screen applcation

Here is additional information on the open, active customer order #4002. This distributed query accesses two databases, VAX-11 and ORACLE, both on the VAX. Further description of the PART is available by positioning the cursor on a part number and pressing <HELP>.

```
Next Task: ___________  CUSTOMER ORDER INFORMATION  Date:2/24/88
Press <PF7> for Keypad Help

Customer Name: US AIR FORCE
Order Number : 4002
Date Placed  : 03-AUG-87
                                    Quantity
   Line Item        Part Number     Required   Due Date   Status
001                 12347                100.00  17-AUG-87    AC
                        +-------------------------------+
                        |        PART INFORMATION       |
                        |                               |
                        | Commodity Cd : AD             |
                        | Part Number  : 12347          |
                        | Part Desc.   : PLATE - BACKUP |
                        | Unit of Meas.: EA             |
                        | Unit Cost    :    621.00      |
                        | Lead Time    :      5.00      |
                        +-------------------------------+
```

Position cursor on part number and press <HELP> for part information

MSG: _1_ Press <QUIT> to return to previous screen applcation

Part HELP is available as a pop-up screen as shown in the outlined box. This query accesses the ORACLE database on the VAX.

```
Next Task: ADDPART___  MAINMENU                    Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

  Customer Order Information
     REVIEWCO   (Review Open Customer Orders)

  Inventory Information
     ADDPART    (Assign New Part to Stock Room(s) )
     INVENTORY  (Stock Room Inventory)
     DELPART    (Delete Part From Stock Room)

  Purchasing Information
     ADDVENDOR  (Insert a New Vendor)
     SUPPLIERS  (Determine Suppliers)
     UPDATEPO   (Update Open Purchase Orders)
     LISTPO     (List Purchase Order Information)

 MSG: _1 Enter task keyword and press <ENTER>          applcation
```

The second task, ADDPART, determines all parts that have not yet been assigned a stockroom, and then assigns a selected part to a stockroom(s).

```
Next Task: _________  ASSIGN NEW PART TO STOCK ROOM(s)
Date:2/24/88
  Press <PF7> for Keypad Help

Quantity Part Number Part Description StockRoom ID     On  Hand
         12356       CARRIER, LINING
         12362       STEPPED SLEEVE
         12363       CARRIER , LINING
         12364       BRAKE DISK - STATOR
         12365       RIVET
         12366       CARRIER , LINING
         12367       WASHER
         12372       RIVET

    1 - Enter stockroom and quantity, press <ENTER> to assign
    2 - Press <HELP> from stockroom ID field to display valid IDs
    3 - Press <QUERY> from Part# to verify assignments

 MSG: __ Stock Room Assignment Entered                  applcation
```

A list of all unassigned parts is displayed. This query accessed nodes VAX and IBM and DBMS ORACLE and DB2 and performed an Outer Join operation against the PART and PART-STOCK-ROOM tables. Suppose Part #12365 is the part needing a stock room assignment. Tab down to line 5 and press <HELP> for valid stockroom IDs.

```
Next Task: _____  ASSIGN NEW PART TO STOCK ROOM(s)Date:
2/24/88
  Press <PF7> for Keypad Help

Quantity Part Number  Part Description  Stock Room ID  On  Hand

     12356            CARRIE            Valid Stock Room IDs
     12362            STEPPE
     12363            CARRIE            FABRICATION - 1
     12364            BRAKE             FABRICATION - 2
     12365            RIVET             FABRICATION - 3
     12366            CARRIE            FABRICATION - 4
     12367            WASHER            FABRICATION - 5
     12372            RIVET             FABRICATION - 6
                                        FINAL - ASSEMBLY
                                        FINISHED GOODS
                                        SUBASSEMBLY

   1 - Enter stockroom                          ENTER> to assign
   2 - Press <HELP> from stockroom ID field to display valid IDs
   3 - Press <QUERY> from Part# to verify assignments


 MSG: _1 Position cursor on desired stock room and press <ENTER>
applcation
```

Valid stockroom IDs is a pop-up screen as shown in the outlined box. The data is provided from the ORACLE database on the VAX. Let's assume, Stockroom FABRICATION-1 is the room being assigned. Press <ENTER> to assign the stockroom to Part #12365.

```
Next Task: _____  ASSIGN NEW PART TO STOCK
ROOM(s)Date:2/24/88
  Press <PF7> for Keypad Help

Quantity Part Number Part Description  Stock Room ID     On  Hand
         12356       CARRIER, LINING
         12362       STEPPED SLEEVE
         12363       CARRIER , LINING
         12364       BRAKE DISK - STATOR
         12365       RIVET
                     FABRICATION - 1_____ _____1000
         12366       CARRIER , LINING
         12367       WASHER
         12372       RIVET
```

1 - Enter stockroom and quantity, press <ENTER> to assign
2 - Press <HELP> from stockroom ID field to display valid IDs
3 - Press <QUERY> from Part# to verify assignments

```
 MSG: _1 Stock Room As  gnment Entered          applcation
```

Now, tab to enter the quantity-on-hand value. This user entered 1000 and pressed <ENTER>.
This INSERTed into the DB2 database on the IBM. Referential integrity checks were performed by accessing the ORACLE database on the VAX to validate the existence of Part #12365 and stockroom with ID FABRICATION-1. To verify that the INSERT worked, tab to part number 12365 and press <query>.

```
Next Task: _____          VERIFY PART/STOCK ROOM
ASSIGNMENTSDate:2/24/88
  Press <PF7> for Keypad Help

  Part Number: 12365_____
                      Quantity
    Stock Room ID     On  Hand    Position cursor on part
number and press <HELP> for part information
 FABRICATION - 1         1000.00
                                   Press <QUIT> to return to
ASSIGN NEW PART TO STOCK ROOM(s) screen



 MSG:  1 Stock Room Inventory Retrieved - Press <CONT> for More
applcation
```

As we can see, the part-stock-room assignment has been performed. This check was verified against the DB2 database on the IBM.
Note: The next application provides the same functionality.

```
Next Task: INVENTORY   MAINMENU                    Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

Customer Order Information
   REVIEWCO  (Review Open Customer Orders)

Inventory Information
   ADDPART   (Assign New Part to Stock Room(s) )
   INVENTORY (Stock Room Inventory)
   DELPART   (Delete Part From Stock Room)

Purchasing Information
   SUPPLIERS (Determine Suppliers)
   UPDATEPO  (Update Open Purchase Orders)
   LISTPO    (List Purchase Order Information)


MSG: _1 Enter task keyword and press <ENTER>          applcation
```

The third task is a check point. The demonstrator returns here to prove that INSERTing or DELETing a part-stock-room assignment worked.

```
Next Task: _____ STOCKROOM INVENTORY        Date: 2/24/88
Press <PF7> for Keypad Help

Part Number: ALL_____

    Enter part number for specific part inventory, press <QUERY>
or enter 'ALL' for complete stock room inventory, press <QUERY>

MSG: _0                                              applcation

Enter "ALL" if data is limited, else, enter a particular part
number for verification.
```

```
  Next Task: _____  STOCK ROOM INVENTORY FOR ALL PARTS
Date: 2/24/88
  Press <PF7> for Keypad Help

  Part Number: 12348_____
                      Quantity
    Stock Room ID     On  Hand    Position cursor on part number
and
                                  press <HELP> for part
information
 FABRICATION - 1          78.00


 MSG: _2 Press <CONT> for More                        applcation
```

This INVENTORY Query accesses the DB2 database on the IBM. All parts are displayed in ascending order. Since each part and all its stockrooms are presented on separate screens, use the <CONT> key to view the entire Inventory.

```
Next Task: DELPART      MAINMENU                Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

Customer Order Information
   REVIEWCO  (Review Open Customer Orders)

Inventory Information
   ADDPART   (Assign New Part to Stock Room(s) )
   INVENTORY (Stock Room Inventory)
   DELPART   (Delete Part From Stock Room)

Purchasing Information
   SUPPLIERS (Determine Suppliers)
   UPDATEPO  (Update Open Purchase Orders)
   LISTPO    (List Purchase Order Information)


MSG: _1 Enter task keyword and press <ENTER>          applcation
```

The fourth task, DELPART, allows the user to delete a part-stock-room assignment where the stockroom's quantity-on-hand is zero.
This query accesses the DB2 database on the IBM.

```
  Next Task: _____          DELETE PART FROM STOCK ROOM
Date: 2/24/88
  Press <PF7> for Keypad Help

  Part Number: 12351_____
                          Quantity
    Stock Room ID         On  Hand     Position cursor on part number
and
                                       press <HELP> for part
information
 FINAL - ASSEMBLY                0.00
                                       Press <DEL> to delete
part/stock
                                       room relationship


 MSG:  2 Relationships Retrieved - Press <CONT> for more
applcation
```

The output is displayed one part per screen. Press <CONT> to display each part. The user may delete any/all assignment(s) by pressing <DEL>.

```
  Next Task: _____ DELETE PART FROM STOCK ROOM Date: 2/24/88
  Press <PF7> for Keypad Help

  Part Number: 12352_____

                        Quantity
    Stock Room ID       On  Hand     Position cursor on part number
and
                                     press <HELP> for part
information
 FABRICATION - 4              0.00
                                     Press <DEL> to delete
part/stock
                                     room relationship




 MSG: _2 Press <CONT> for More                    applcation
```

This user did not elect to delete any assignments, but merely to view all parts with zero quantity-on-hand.

```
Next Task: ADDVENDOR   MAINMENU                Date: 3/28/88

                    MAIN MENU

Customer Order Information
   REVIEWCO   (Review Open Customer Orders)

Inventory Information
   ADDPART    (Assign New Part to Stock Room(s) )
   INVENTORY  (Stock Room Inventory)
   DELPART    (Delete Part From Stock Room)

Purchasing Information
   ADDVENDOR  (Insert a New Vendor)
   SUPPLIERS  (Determine Suppliers)
   UPDATEPO   (Update Open Purchase Orders)
   LISTPO     (List Purchase Order Information)


MSG: _1 Enter task keyword and press <ENTER>    applcation
```

The fifth task, ADDVENDOR, allows the user to add new vendors for a specified commodity code. The assumption is that a vendor supplies all the parts associated with a commodity code.

```
Next Task: _____ ADD NEW VENDOR(S)          Date: 3/28/88

  Commodities Supplied    ( Mark choices with an X )
          AA  RAW MATL STEEL
          AB  HDWE ITEM
          AC  RAW FORGING
          AD  MACHINED PART
          AE  ASSEMBLY

          Press <QUERY> to select parts for commodities OR
          Press <MENU> to return to MAINMENU

 MSG: _0                                              applcation
```

The first screen presents a list of the valid commodity codes and their descriptions. This data is retrieved from the Oracle Database on the VAX.

```
Next Task: _____  ADD NEW VENDOR(S)          Date: 3/28/88

  Commodities Supplied   ( Mark choice with an X )
          AA  RAW MATL STEEL
          AB  HDWE ITEM
      X   AC  RAW FORGING
          AD  MACHINED PART
          AE  ASSEMBLY




        Press <QUERY> to select parts for commodities OR
        Press <MENU> to return to MAINMENU

MSG: _0                                          applcation
```

The user places an 'X' in front of the commodity code that will be supplied by the new vendor or vendors. The user then presses the <QUERY> key to retrieve all the part numbers associated with the commodity code chosen.

Next Task: _____ INSERT VENDOR INFORMATION Date: 3/28/88

Commodity Selected: AC

Associated Part Numbers
12348

Vendor No Vendor Name Rating Point of Contact
Phone Number

Enter Vendor information and press <QUERY> OR
Press <QUIT> to return to Commodity Code list

MSG: 1 Parts to be supplied by new vendor(s) have been selected applcation

The part numbers associated with the commodity code are retrieved from the VAX Oracle database and the vendor input form is presented.

Next Task: _____ INSERT VENDOR INFORMATION Date: 3/28/88

Commodity Selected: AC

Associated Part Numbers
12348

Vendor No	Vendor Name	Rating	Point of Contact	Phone Number
42210	CDC	10	D. ALBANI	294-1751
42211	ALLIED-EGRY	5	T.ACHESON	234-5472

Enter Vendor information and press <QUERY> OR
Press <QUIT> to return to Commodity Code list

MSG: 1 Parts to be supplied by new vendor(s) have been selected applcation

The user enters the vendor information and presses the <QUERY> key, which starts up insert actions into two entities, VENDOR and PART_VENDOR.

Since VENDOR is vertically partitioned between the IBM DB2 database and the VAX Oracle database, two internal schema insert transactions were generated along with a key uniqueness check. One insert transaction inserts vendor no., vendor name and vendor rating into the DB2 partition, and the other insert transaction inserts vendor no., point of contact and phone number into the Oracle partition.

The insert transaction for PART_VENDOR associates each part number in the associated parts list with each vendor in the vendor input form. In our example, two rows of data are inserted into PART_VENDOR on the ORACLE VAX database.

Next Task: _____ INSERT VENDOR INFORMATION Date: 3/28/88

Commodity Selected: AC

Associated Part Numbers
12348

Vendor No	Vendor Name	Rating	Point of Contact	Phone Number
42210	CDC	10	D. ALBANI	294-1751
42211	ALLIED-EGRY	5	T.ACHESON	434-5472

Vendor and Part-Vendor Insert actions completed
Press <MENU> to return to MAINMENU

MSG: applcation

When all insert transactions are finished, a completion message is displayed and the user returns to the main menu.

```
Next Task: SUPPLIERS   MAINMENU                    Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

Customer Order Information
   REVIEWCO  (Review Open Customer Orders)

Inventory Information
   ADDPART   (Assign New Part to Stock Room(s) )
   INVENTORY (Stock Room Inventory)
   DELPART   (Delete Part From Stock Room)

Purchasing Information
   ADDVENDOR (Insert a New Vendor)
   SUPPLIERS (Determine Suppliers)
   UPDATEPO  (Update Open Purchase Orders)
   LISTPO    (List Purchase Order Information)



MSG: _1 Enter task keyword and press <ENTER>          applcation
```

The sixth task is SUPPLIERS. In this user's review process, there is a need to determine which part has a low quantity-on-hand so that it can be re-ordered. A vendor with a good rating, who currently supplies this part, has to be determined.

```
Next Task: __________ DETERMINE SUPPLIERS   Date: 2/24/88
Press <PF7> for Keypad Help

Commodity Code: __

Commodity
  Code          Commodity Description
   AA       RAW MATL STEEL
   AB       HDWE ITEM
   AC       RAW FORGING
   AD       MACHINED PART
   AE       ASSEMBLY
```

Position Cursor on Desired Commodity Code and Press <ENTER>

```
 MSG: 1 Commodity Codes Retrieved - Press <CONT> for More
applcation
```

In this scenario, each part is associated with a commodity code. A pop-up HELP window provides a list of valid commodity codes. These codes are retrieved from an ORACLE database on the VAX.

```
  Next Task: _____ COMMODITY CODE PARTS LIST Date: 2/24/88
  Press <PF7> for Keypad Help

  Commodity Code: AA
Quantity Unit Lead TimePart Number Description On Hand MeasIn Days
 12352                             STEEL          0.00   EA  15.00
 12354                             STEEL       2614.00   EA  20.00
 12359                             STEEL        429.00   EA  10.00
 12368                             STEEL       7196.00   EA  10.00
 12371                             STEEL          0.00   EA  10.00


     Position Cursor on Part#, Press <QUERY> to Display Vendors
for a Part


 MSG: _1 Associated Parts Retrieved - Press <CONT> for more
applcation
```

This user wanted all parts associated with Commodity Code "AA". The information on this screen is provided by accessing the DB2 database on IBM and ORACLE database on the VAX.
It is determined that Part #12352 needs to be re-ordered. Press <QUERY> to display vendors for a part.

Next Task: _____ VENDORS FOR A SPECIFIED PART Date:2/24/88
Press <PF7> for Keypad Help

Part Number: 12352

Vendor Name	Point of Contact	Phone Number	Rating
ACME STEEL	STEVEN SMITH	202-555-9063	9
AAA STEEL	JONATHON ADAMS	501-433-5561	8

Press <QUIT> to return to commodity code/parts list screen

MSG: 1 Vendors for part retrieved - Press <CONT> for More applcation

This is a list of all vendors currently providing Part #12352. This information is provided by accessing the vendor data which is vertically partitioned between the DB2 and ORACLE databases. The user of this application may now choose a particular vendor to provide the part.

```
Next Task: UPDATEPO    MAINMENU                          Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

Customer Order Information
   REVIEWCO   (Review Open Customer Orders)

Inventory Information
   ADDPART    (Assign New Part to Stock Room(s) )
   INVENTORY  (Stock Room Inventory)
   DELPART    (Delete Part From Stock Room)

Purchasing Information
   ADDVENDOR  (Insert a New Vendor)
   SUPPLIERS  (Determine Suppliers)
   UPDATEPO   (Update Open Purchase Orders)
   LISTPO     (List Purchase Order Information)


MSG: _1 Enter task keyword and press <ENTER>  applcation
```

This task lists all open purchase orders of a specified vendor. The user may update these open P.O.'s identified by a status code of "AC" to either completed "CO" or canceled "CA".

```
Next Task: _____ UPDATE PURCHASE ORDERS  Date: 2/24/88
Press <PF7> for Keypad Help

Vendor Name: _____________________

Valid Vendor Names
AAA STEEL
ACME STEEL
AMERICAN FORGING
USA PARTS
WHITE MACHINE CO.
```

Position cursor on desired vendor name and press <ENTER>

```
MSG: _1 Valid Vendor Names - Press <CONT> for More    applcation
```

HELP in the form of a pop-up window is available to list all vendors. Vendor names are retrieved from the DB2 database on the IBM.

Next Task: _____ UPDATE PURCHASE ORDER STATUS Date:2/24/88
Press <PF7> for Keypad Help

Vendor Name: AAA STEEL_____

PO Number	Line Item	Part Number	Due Date	Status
3005	001	12352	24-AUG-87	AC
3006	001	12354	31-AUG-87	AC

1 - Update line item status and press <ENTER>
2 - Position cursor on status, press <HELP> for valid status codes
3 - Position cursor on part number, press <HELP> for part information
4 - Position cursor on PO number, press <HELP> for detail PO info

MSG: 1 Active POs Retrieved - Press <CONT> for More applcation

This user entered AAA STEEL as the vendor to determine all their active purchase orders. This query accessed the DB2 database on the IBM and ORACLE on the VAX to retrieve information about active PO line items.

```
Next Task: __________  UPDATE PURCHASE ORDER STATUS Date:2/24/88
Press <PF7> for Keypad Help

Vendor Name: AAA STEEL

      PO Number          Line Item   Part Number   Due Date Status
                                                +-------------------+
3005          001                    12352       |CO - Complete      |      AC
3006          001                    12354       |CA - Cancel        |      AC
                                                |                   |
                                                | Position cursor   |
                                                | on desired status |
                                                | code and press    |
                                                | <ENTER>           |
                                                +-------------------+
```

1 - Update line item status and press <ENTER>
2 - Position cursor on status, press <HELP> for valid status codes
3 - Position cursor on part number, press <HELP> for part information
4 - Position cursor on PO number, press <HELP> for detail PO info

MSG: 1 Position cursor on desired status and press <ENTER> applcation

This user determined that PO #3006, line item 1, is complete and needs updating. A pop-up window provides valid status codes. Exercise Option 4 to review detail purchase order information.

```
Next Task: _____ UPDATE PURCHASE ORDER STATUS Date:2/24/88
Press <PF7> for Keypad Help

Vendor Name: AAA STEEL

PO Number  Line Item   Part Number   Due Date   Status
                PART INFORMATION
24-AUG-87      AC

31-AUG-87      CO
   Part Number  : 12354

   Part Desc.   : STEEL

   Unit of Meas.: EA

   Unit Cost    :      1.01

   Lead Time    :     20.00
```

1 - Update line item status and press <ENTER>
2 - Position cursor on status, press <HELP> for valid status codes
3 - Position cursor on part number, press <HELP> for part information
4 - Position cursor on PO number, press <HELP> for detail PO info

```
MSG: _1 Press <QUIT> to return to previous screen    applcation
```

Detailed description about a part is available, again, as a pop-up window. This user modifies the status to "CO" and presses <ENTER> to update. The update is performed in the DB2 database on IBM. Exercise Option 4, once again, to review detail Purchase Order Information.

```
Next Task: LISTPO       MAINMENU                    Date: 2/24/88
Press <PF7> for Keypad Help

                    MAIN MENU

Customer Order Information
   REVIEWCO  (Review Open Customer Orders)

Inventory Information
   ADDPART   (Assign New Part to Stock Room(s) )
   INVENTORY (Stock Room Inventory)
   DELPART   (Delete Part From Stock Room)

Purchasing Information
   ADDVENDOR (Insert a new Vendor)
   SUPPLIERS (Determine Suppliers)
   UPDATEPO  (Update Open Purchase Orders)
   LISTPO    (List Purchase Order Information)


MSG: 1 Enter task keyword and press <ENTER>          applcation
```

The final application, LISTPO, is a checkpoint. It is exercised to verify that purchase order information has been updated. It also provides a purchase order review.

```
Next Task: _____ PURCHASE ORDER INFORMATION Date: 2/24/88
Press <PF7> for Keypad Help

 Purchase Order Number: 3006_____

Line Item          Part Number        Due Date     Status
    001                 12354        31-AUG-87       CO
```

1 - Position cursor on part number and press <HELP> for part information
2 - Enter new PO# and press <QUERY> to display PO information

```
 MSG: 1 PO Information Retrieved - Press <CONT> for more
applcation
```

A purchase order number is entered. This query accesses the ORACLE database on the VAX and the DB2 database on the IBM to retrieve all line items, associated parts and the status.

```
Next Task: _____ PURCHASE ORDER INFORMATION Date: 2/24/88
Press <PF7> for Keypad Help

Purchase Order Number: 3006_____

    Line Item            Part Number       Due Date        Status

                                           31-AUG-87         CO

    PART INFORMATION

Part Number    : 123543
Part Desc.     : STEEL
Unit of Meas.  : EA
Unit Cost      :    1.01
Lead Time      :   20.00
```

1 - Position cursor on part number and press <HELP> for part information
2 - Enter new PO# and press <QUERY> to display PO information

```
MSG: 1 Press <QUIT> to return to previous screen
applcation
```

To obtain further part descriptions, HELP is available as a pop-up window as shown in the outlined box. Part information is available from the ORACLE database.

This concludes the demonstration.

SECTION 5

CONCLUSION

In summation, IISS provides many benefits to:

Programmers
Users
Management and
Business

For programmers, it:

- o hides detail of different computers
- o obtains data from several independent systems with a single request

For users, it:

- o provides common interface and procedures to several independent systems

For management, it:

- o provides timely, accurate information through common data and on-line environment

For business it:

- o directs creativity of entire organization to running more productive factories
- o causes computers to fade into the background as support systems

IISS DEMO

APPENDIX A - DATABASE BUILD

I. FILES TO CREATE THE DATABASES AND LOAD THE DATA

A. ORACLE DATABASE

1. Create ORACLE Database

- MFG.UFI

2. Load Tables with Data

- VENDOR.UFI
- PART.UFI
- CC.DAT, CC.UFI
- STKRM.DAT, STKRM.UFI

B. VAX-11 DATABASE

1. Create VAX-11 Database

- CUSTD.DDL

2. Load Records with Data

- CUSTD.LFL
- CUSTD1.INP
- CUSTD1.LSL
- CUSTD2.INP
- CUSTD2.LSL
- CUSTD3.INP
- CUSTD3.LSL

C. DB2 DATABASE

1. Create DB2 Database

- PURCH.DDL

2. Load Tables with Data

- PURPO.DAT
- PURPOLI.DAT
- PURPSR.DAT
- PURPTVN.DAT
- PURVNDR.DAT

II. PROCEDURES AND STEPS TO CREATE AND LOAD THE DATABASES

A. ORACLE DATABASE

1. Create the Database on VAX

```
$ UFI  CDM/CDM
  > START MFG.UFI
    (Creates MFG Database 4 Tables and Indexes)
```

2. Load 4 Tables with Data

```
$ UFI MFG/MFG
  > START PART
    (Loads Data into PART)

  > START VENDOR.UFI
    (Loads Data into VENDOR)

$ ODL  CC.DAT  CC.ERR  MFG/MFG  -C1  -E1
  (Examine CC.ERR for Errors)
  (Loads Data into COMMODITY CODES)

$ ODL  STKRM.DAT  STKRM.ERR  MFG/MFG  -C1  -E1
  (Examine STKRM.ERR for Errors)
  (Loads Data into Stock Room)
```

B. VAX-11 DATABASE

1. Create the Database on VAX

```
$ DDL/COMPILE  CUSTD.DDL
$ DBO/CREATE   CUSTD
```

2. Load 3 Tables with Data

```
$ DBO/LOAD/FORMAT=CUSTD.LFL/SEQUENCE=CUSTD1.LSL/
                FILE=CUSTD1.INP/LOG      CUSTD

$ DBO/LOAD/FORMAT=CUSTD.LFL/SEQUENCE=CUSTD2.LSL/
                FILE=CUSTD2.INP/LOG      CUSTD

$ DBO/LOAD/FORMAT=CUSTD.LFL/SEQUENCE=CUSTD3.LSL/
                FILE=CUSTD3.INP/LOG      CUSTD
```

C. DB2 DATABASE

1. Create the database on IBM

Choose the DB2 option from the ISPF Main Menu

Choose the SPUFI option from the DB2 menu

Execute PURCH.DDL

2. Load 5 tables with data

Choose the DB2 option from the ISPF Main Menu

Choose the SPUFI option from the DB2 menu

Execute PURPO.DAT
Execute PURPOLI.DAT
Execute PURPSR.DAT
Execute PURPTVN.DAT
Execute PURVNDR.DAT

IISS DEMO

APPENDIX B - IISS DEMO ENVIRONMENT

I. FILES REQUIRED TO BUILD THE IISS DEMO ENVIRONMENT

A. NDDL FILES TO DEFINE THE SCHEMAS

- DEMODOM.DAT
- DEMOCS.DAT
- DEMOIS.DAT
- DEMOMAP.DAT
- DEMOES.DAT
- DEMOALG.DAT

NOTE: File DEMOIS.DAT must be edited to specify the exact location of the VAX-11 database CUSTD.

B. FILE CONTAINING THE IISS DEMO APPLICATION

- IISSDEM.FDL
- IISSVEN.PRC

C. RELATED FILES

- DATE1.COB
- DATE2.COB

II. PROCEDURES TO BUILD THE IISS DEMO ENVIRONMENT

A. DEFINE THE SCHEMAS

At the VAX $ prompt, proceed as follows:

```
$ NDDL DEMODOM
$ NDDL DEMOCS
$ NDDL DEMOIS
$ NDDL DEMOMAP
$ NDDL DEMOES
$ NDDL DEMOALG
```

At the end of these steps, the Domains, Conceptual Schema, Internal Schema, External Schema and Inter Schema Mappings will be defined to the CDM.

B. COMPILE THE COMPLEX MAPPING ALGORITHM

At the VAX $ prompt, proceed as follows:

```
$ COBGLIB  DATE1
$ COBGLIB  DATE2
```

The objects will be placed in the object library

GENOLB.OLB

C. CREATE THE APPLICATION

At the VAX $ prompt, execute the procedure file GENAP.COM. Proceed as follows:

```
$ GENAP
```

APPLICATION GENERATOR MAIN MENU

```
1.  Gap Only
2.  Precompile Only
3.  Link Only
4.  Gap And Precompile
5.  Precompile And Link
6.  Gap, Precompile, And Link
7.  Help - Option Descriptions
8.  Exit

PLEASE ENTER AN OPTION NUMBER:  1
ENTER NAME OF THE .FDL FILE:  IISSDEM
ENTER YOUR CDM USERNAME/PASSWORD:  CDM/CDM
```

At the end of this step, the forms for the ADL application IISSDM have been compiled, the IISSDM.PRC file has been generated, and the IISSDM.C has been generated, compiled and placed in the library. At the VAX $ prompt, execute the procedure file GENAP.COM again. Proceed as follows:

```
$ GENAP

***APPLICATION GENERATOR MAIN MENU***

1.  Gap Only
2.  Precompile Only
3.  Link Only
4.  Gap And Precompile
5.  Precompile And Link
6.  Gap, Precompile, And Link
7.  Help - Option Descriptions
8.  Exit

PLEASE ENTER AN OPTION NUMBER:  5
ENTER YOUR CDM USERNAME/PASSWORD:  CDM/CDM
ENTER NAME OF LOGICAL UNIT OF WORK:  IISSDEMO
ENTER NAME OF HOST WHERE APPLICATION WILL RUN:  VAX
DO YOU WANT OBSOLETE GENERATED CODE DELETED? (Y/N): Y
DOES THE APPLICATION ACCESS ANY IBM DATABASES?
(Y/N):Y
ENTER YOUR IBM USERNAME:  (DEPENDENT ON YOUR TESTING
                           ENVIRONMENT)
ENTER YOUR IBM PASSWORD:  (DEPENDENT ON YOUR TESTING
                           ENVIRONMENT)
ENTER THE PDS NAME FOR YOUR IBM SOURCE CODE:
                          (DEPENDENT ON YOUR TESTING
                           ENVIRONMENT)
ENTER NAME OF PRC (C/R TO STOP, LEAVE.PRC OFF):
                           IISSDM
ENTER NAME OF PRC (C/R TO STOP, LEAVE.PRC OFF):
                           IISSVEN
ENTER NAME OF PRC (C/R TO STOP, LEAVE.PRC OFF): <CR>
```

At the end of this step, the application IISSDM has been created i.e., the application has been precompiled, the generated code compiled, placed in the library at the appropriate host computer and an executable IISSDMZZ.EXE has been created.

D. UI ENVIRONMENT

1. Using the SYSGEN utility, define the User/Password/Role and Function to be IISSDEMO. Make sure the Form_file_Name specifies: [forms dir]%S.FD

2. The procedure file GENAP.COM will automatically FLAN the file IISSDM.FDL to create the form definitions.
   Ensure the logical IISSULIB points to where the forms are located.

E. NTM ENVIRONMENT

1. There must be two NTMS on VAX and IBM, which must be connected to the same port of the protocol converter.

2. NTM Tables (APITBL, APTTBL) must be updated on IBM with the application name and the IBM RP-Main. NTM Tables on the VAX are automatically updated by the Procedure GENAP.COM.

F. RUN ENVIRONMENT

1. Three Executables, two remote RP Mains (one on the IBM and the other in the VAX runarea) and the Application IISSDMZZ in the VAX runarea environment are automatically created by the procedure file GENAP.COM.

2. The VAX DIRTBL must have an entry for "DM" which points to where the demo executables are located.

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