UNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)

paper discusses reasons for having communications between
rs in a remote network. Objectives are set for such a
and the implementation is described.

1)    Manager, APL Sales - Proprietary Computer Systems,
      Inc., San Francisco, California

Until the present, communications between APL users was most
often ad lib and usually done via devices that were ill-suited to
communications. Data were either distributed through a highly
structured application using files, or passed via one of many
inconvenient techniques such as (1) copying or loading from
another's APL workspace; (2) creating an APL file and then
announcing the file's address; (3) using a system designed for
textual messages and distributing the data in non-numeric form.
News items were often kept in an APL workspace which had to be
loaded, or at-best they were kept in a separate news system where
they were totally isolated from other communications. Messages,
while the object of many APL programs, were too often limited to
character text. A system has been developed which combines the
three co-equal goals of distributing data, general news items,
and personal messages.

The most important objective for a communications system is ease
of use. Since many of those communicating will not be
programmers, the system must be English-like. A second criteria
is that all communications be done by a single comprehensive
system. Finally, the system should not require that both
participants be signed on simultaneously.

COMMUNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)

Essentially the users of an APL installation have two modes in which they may communicate. The first is when they share data through a structured application. These users may or may not have knowledge of their partners in the application. An example of unfamiliar sharing is the Civil Aeronautics Board data base shared by several corporations and firms. An example of familiar partners might be an inventory system where many employees of the same company read and/or input data.

The second mode of communication is highly unstructured. Often users must send an ad hoc result to another location, or perhaps they must seek advice on a programming technique. They might have a program to show to a colleague for criticism; or they might have a table of values to distribute. Finally, the installation managers might wish to announce enhancements, schedule changes, new programs, etc.

Proprietary Computer Systems has implemented a single all-purpose communications system which is called simply "MSG." Its major capabilities are:

- allows users to communicate by name and/or
  account number,

- distributes data,
- distributes APL functions,
- disseminates news of general interest,
- handles textual messages
- allows distribution lists.

COMMUNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)

Technical Considerations

Each user has his own MSG file. This provides the greatest security for user's data. Were all users to be on one shared file , then any user might potentially discover what file was shared by all -- and then read messages other than his own. The P.C.S. MSG files are set up so that only the owner of the file may read what is in his MSG list. Any other user is limited to sending data to the file -- even if he knows which it is.

Moreover, by having many separate files, rather than one shared file, the MSG system does not require the use of a hold/release discipline. This represents a large gain in response-time efficiency.

The record delete facility of the PCS/APL file management system was utilized by allowing the relative positions of the MSGs to be their referants. That is, the third MSG waiting is called MSG 3, when it is deleted the next oldest MSG becomes MSG 3.

Individual records in a MSG file fall into three categories:

- Numeric or character data arrays
- Character representations of APL code
- Textual messages or news items

Data is returned as an explicit result of the READ function. Messages are returned implicitly, but are also available in a global MSG variable. APL code may be received either as a function in the MSG WS or as a character variable.

Entering data and/or APL code is accomplished with a FROM function:

    MSG IS FROM 'WORKSPACE OBJECT'

The capability of executing a system COPY command within an APL function is used to )COPY WORKSPACE OBJECT into the MSG WS. The USE function of PCS 1 WSFNS is then called upon to diagnose the nature of the object, i.e. whether it is a function or variable. If the object is a function, it is transformed to its character representation using CR from the PCS public library. Nevertheless, MSG is assigned an APL data structure which can be forwarded to a PCS/APL file. A second mode for FROM is to use a numeric argument which is an address for retrieving from a private file.

COMMUNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)

Listing of MSGs and/or news items may require lengthy output which quite reasonably will be interrupted by the user. Such an event is programmed for, using the PCS error trapping capability. The workspace returns to calculation mode after an instruction response by the program.

News items are kept in a standard MSG file in a public library. By entering a single word:

    NEWS
The user is diverted to reading NEWS items. Furthermore, an entry is made in a NEWS directory indicating the timeliness of the user's news inquiry. One chooses which NEWS items are of interest by listing those outstanding; and then reads individual items.

The most direct way to describe the MSG system is by example. The following exhibits show how the system handles data, news, APL code, and textual messages.

--DATA--

```
    )LOAD 7 MSG
SAVED ..... .....
PEN NAME: CHUCK
2 NEWS ITEMS AND
3 MSGS WAITING.
LIST?: YES
    3, 17:10 12/24  (INTEGER VARIABLE)
    2, 12:00 12/24  (CHARACTER VARIABLE)
    1, 18:45 12/23  (BOOLEAN VARIABLE)

    X IS READ 1
MSG 1 SENT 12/23 AT 6:45 PM PST
(BOOLEAN VARIABLE)
    Y IS READ 2
MSG 2 SENT 12/24 AT 12:00 PM PST
(CHARACTER VARIABLE)
    Z IS READ 3
MSG 3 SENT 12/24 AT 5:10 PM PST
(INTEGER VARIABLE)
    DELETE 1 2 3
    X
1 0 1 0 0 1
    Y
SAN FRANCISCO     3.2      17
CHICAGO           9.1     (8.6)
NEW YORK         12.3      8.7
    Z
193
```

(Note: IS is to be read as the APL assignment operation.)

--NEWS--

```
     )LOAD 7 MSG
SAVED ..... .....
PEN NAME: CHUCK
2 NEWS ITEMS AND
NO MSG WAITING.
     NEWS
2 NEWS ITEMS SINCE 12/20
LIST?: YES
100, 15:52 12/23 NEW WORKSPACE IN LIBRARY 1
 99, 10:17 12/20 EXTENDED DOCUMENTATION PROGRAM
     READ LAST 2
ITEM 99 SUBMITTED 12/20 AT 10:17 AM PST
NEWS: EXTENDED DOCUMENTATION PROGRAM
     THE PROGRAM DOCUMENT NOW DOCUMENTS VARIABLES AS
WELL AS FUNCTIONS.  FOLLOWING LISTINGS OF ALL FNS IN WS
WILL BE A TABLE SHOWING VAR NAME, TYPE, AND SHAPE.
PLEASE  )COPY 1 APL DOCUMENT  TO USE DOCUMENT.

ITEM 100 SUBMITTED 12/23 AT 3:52 PM PST
NEWS: NEW WORKSPACE IN LIBRARY 1
     LIBRARY 1 NOW CONTAINS WORKSPACE 'APL' WHICH IS
GROUPED IN THIS FASHION:
SV     SHARED VARIABLE EMULATOR: )COPY 1 APL SV
WORDS  RESERVED WORDS FOR ASCII TERMINAL WITHOUT APL CHARS
EDIT   LOCATE STRINGS WITHIN FNS--CROSS REFERENCE LISTING
SYSFNS FN TO CHAR, CHAR TO FN, NAME LIST OF GRPS, FNS, VARS
```

--MESSAGES--

```
     )LOAD 7 MSG
SAVED ..... .....
3 MSGS WAITING.
LIST?: YES
 3, 13:45 12/31 TOM: YOU'LL LOVE IT
 2, 15:30 12/30 DICK: CONFIDENTIAL
 1,  9:42 12/30 HARRY: B SPECS
     READ ALL
MSG 1 SENT 12/30 AT 9:42 AM PST
HARRY: B SPECS
     I HAVE THE SPECIFICATIONS READY FOR THE ACME MASTER
UPDATE PROGRAM.  IT'LL BE SUBMITTED THROUGH R.J.E.  IF YOU
ARE INTERESTED WE'LL FORWARD THE SPECS TO YOU.

MSG 2 SENT 12/30 AT 3:30 PM PST
DICK: CONFIDENTIAL
     THE TEXT EDITING FUNCTION IS READY.  YOU CAN
)COPY 1 APL TEXT  TO USE IT.  LET ME KNOW HOW YOU LIKE IT.

MSG 3 SENT 12/31 AT 1:45 PM PST
TOM: YOU'LL LOVE IT
     THE PROGRAM I MENTIONED TO YOU IS READY.  IT'S
CALLED 'COMNET' AND ITS IN LIBRARY 700.  YOU CAN COMPUTE
THE LOWEST COST TELEPHONE RATES BETWEEN ANY TWO POINTS

DELETE ALL ABOVE?: YES
```

COMMUNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)

```
      )LOAD 7 MSG
SAVED ..... .....
PEN NAME: CHUCK
NO MSG WAITING.

      SEND
TO: WARREN
HEADING: URGENT
MESSAGE: THE NEXT MSG FROM ME WILL BE THE CODE FOR THE
'AND' FUNCTION WHICH GATHERS DATA FROM THE FILES IF
NECESSARY FOR THE FILE PLOTTING PACKAGE.  LET ME KNOW
WHAT YOU THINK SO I CAN INSTALL IT.    CFW

SENT 8:30 PM PST 1/03/74

      MSG IS FROM 'PLOTTEST AND'
SAVED   20.15.47 01/03/74

      FORWARD
TO: WARREN
SENT 8:33 PM PST 1/03/74
```

COMMUNICATIONS BETWEEN USERS IN A DISPERSED A.P.L. NETWORK

Charles Weiss (1)