To JMB about AFSDC document plan

Jeanne: We've read your message (31857,) about the AF Manual (cf--25298,) and the obvious misalignment of expectations, communications, etc. The best we can do is to wait until Tuesday; Jim Norton will talk to you about it then, Elizabeth Michael will return then and Dick will talk with her, then DIck and Jim (and perhaps I) can decide who should straighettn out just what with whom. 1

We're looking forwrd to seeing you and hearing of your adventures. Pleased to have you out there representing us, wish we could safeguard you against the bumps a bit better. You'll be interested to note that presentation of the Network problems (that are at the root of the main service problems over the pst weeks) will be about the first order of business for the KWAC meeting Tuesday morning. That will probaly be over with (at least the bloodiest part) before you join us. Regards, Doug 2

DCE 14-FEB-75 17:16 25401

To JMB about AFSDC document plan

(J25401) 14-FEB-75 17:16;;;; Title: Author(s): Douglas C. Engelbart/DCE; Distribution: /JBM([ACTION]) JCN([INFO-ONLY]) RWW([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: DCE;

CHI 14-FEB-75 17:50 25402

Questions to MCA about the WM -- Things we think should be documented

sent via sndmsg to Millstein, Warshall, Sattley,

Questions to MCA about the WM -- Things we think should be documented

Bob, this is a list of questions we have so far. They do not reflect our recent phone calls and are being sent just to give you something to start work on. Next week we will send out an update of this memo that reflects our understanding of answers to some questions (based on recent convesations) and suggested answers to the rest. Hope this helps you undersand what we need to know about the WM. 1

NSW Version Number 2

Since the capabilities made available by the FE and the WM will undoubtedly change in slight ways over time, we suggest that both the FE and WM make available a function or data store that contains a version number which can be used by tools to determine what capabilities they should attempt to use. 2a

Please describe in detail the following File Primitives: 3

Create File 3a

Open File 3b

Close File 3c

Create new version of a file 3d

Is there the concept of versions of a file in the nsw? Can a user get at earlier versions of a file? What sorts of file backup are you planning to support? What does the user do to get back a copy of a file from last week (if, say, today's copy is bad for some hardware or software reason)? 3d1

Copy File 3e

Rename File 3f

Lock/unlock File 3g

Assuming user has delete access to the file. What can we store with the lock? User-id? Individual-id? User-name? Project name? 3g1

IS File Locked 3h

In addition to yes/no, what can we get back? User-id? individual-id? user-name, project name? 3h1

BAck up one version for File 3i

Delete file 3j

Questions to MCA about the WM -- Things we think should be documented

Undelete file 3k

Will you support this? 3k1

Expunge deleted File 31

Permanently reclaims storage space. 311

Archive File 3m

Are you going to make an archival service available to the nsw users? This is not the same as a file backup system, which we assume you are providing to insure file system integrity. This archival service allows user to store away files on a semi-permanent basis for later use. 3m1

Retrieve File from Archive 3n

Trim Directory 3o

Allow user to delete all but highest N (user specified) versions of the files in his current working directory. 3o1

File Access 4

Some special system-level tools (Journal, Sndmsg) need read, write, or append access to certain files belonging to all users. How do we implement the Journal background delivery process? What special capabilities will you provide which will let it write on files belonging to other users? 4a

In our current implementation, the user tool, Sendmail (the ARC Journal), creates a file containing the mail specifications in a fixed directory to be processed by the delivery process. The delivery process is a privileged system process and may write on files belonging to all users. 4a1

Use Types or Attributes 5

What are the currently defined use types? How are new ones introduced? How are they specified in open-file and other primitives? What conversion routines do you think we are writing? 5a

List Filenames 6

List filenames for a user, a project, and any element of a filename including usetype. 6a

File status information (attributes and locks) should be optionally included in the list. 6b

File Status Information available from WM 6c

Creation date 6c1

Last read date 6c2

Last write date 6c3

Creator, last writer, last reader 6c4

Size 6c5

Access controls 6c6

Locked (by whom) 6c7

File Name Recognition 7

What is the primitive that does filename expansion and how is it called? 7a

By the way, based on our accumulated user experience, your inability to complete partially specified fields of filenames seems a serious deficiency from the user's point of view, since it does not allow him to type part of a field and ask that the rest of the name be recognized. Many users will only deal with one field of the file name, using scope control (working directory) to do the rest. For these users you are providing no file name recognition at all! We hope you will reconsider this limitation. 7a1

Is it true that the ordering of file name elements is unimportant? That is is a,b the same file as b,a ? 7b

What if the user wants to simulate hierarchical directories by giiving files ordered name elemets? 7b1

Work files 8

Should work files (such as SendMail uses) be NSW files or purely local files? If they are local, how hard is it to enter them into the NSW? 8a

Frontend Needs 9

Questions to MCA about the WM -- Things we think should be documented

What does the RUNTOOL primitive do and what are arguments and results? 9a

Get grammar for a tool given tool-id supplied by runtool. 9b

Get user profile for FE, given user-id. 9c

Login primitive args and results. 9d

Logout 9e

Terminate terminate tool given tool-id or all tools 9f

What are special file names for local printer, card reader, tape drive? 9g

Is there a relog primitive? 9h

Is there a primitive to find out who else is currently using the NSW? 9i

What about finding out if a particular user is loged on and where (FE, terminal number)? 9j

How are background processes such as the Journal delivery process started up? Will the WM do it or should they come up with the host like the WM and FE? 10

Get a User ID: an integer (starting at 1 -- at most 21 bits for now) plus a Character string (max 50 characters, say) 11

Gven login ID (name, project) get the unique number for the person so you cna get his user profiles. 11a

Given the number, get the character string 11b

Given the character string, get the number 11c

Note: Eventually we will need much more information about an individual from the WM, e.g. U.S. mail address, telephone number, etc. 11d

Get the NSW date and time. The time should be the same for everybody, properly converted for the frontend's time zone. 12

Create a New tool 13

What steps are involved in creating a new nsw tool? How is the grammar installed? The help data base? the list of processes to

create to support this tool (will this really be read from the grammar?)? How are tool access rights given out? Do some people have an attribute of tool-creator and others can't do this? 13a

Create a sub-tool 14

This is similar to the create tool questions, except that an already created process is used (please refer to my memo on user programs). What, if any, problems exist here? 14a

If a grammar wants to use an existing process the WM should not create a new process if an instance of the desired process already exists. 14b

When several grammars are using the same instance of a BE process we would like the WM to maintain a use count for that process, and delete the process only when it's use count goes to zero. 14c

How does one allow other people access to tools, user programs, files, working directories? 15

How does one get accounting information for himself, another User, Project, etc. 16

How does one change project without logging out and logging in again (relog). 17

Where are the FE user profiles stored? Will the WM provide a primitive to get and store it or will it just be a file-naming convention based on individual ident string? (We assume that tools that wish to preserve user-specific data accross session bounderies, will store the data in files whose names are based on individual or user-project idents.) 18

Crashes: how do We save the state of a user's active (local) files? e.g. if the system crashes while he is editing how much will he loose? Please note that loosing the state of local files if a TBH crashes is quite unacceptable from our point of view. We have worked hard to make NLS files as crash resistant as we can. An NLS user now seldom looses more than the edit he was making at the time of the crash. We have worked hard to gain this and will not give it up easily. 19

Batch tool questions. 20

How is a user notified when his batch job is completed? 20a

How does a user writing his own JCL get a handle on WM file names? 20b

Questions to MCA about the WM -- Things we think should be documented

What sort of JCL will be available ? Will there be several virtual types of JCL which in turn map into machine dependent JCL? How does the user interact with this tool? 20c

Questions to MCA about the WM -- Things we think should be documented

(J25402) 14-FEB-75 17:50;;;; Title: Author(s): Charles H. Irby/CHI;
Distribution: /NPG([INFO-ONLY]) WEC([INFO-ONLY]) LAC([
INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: CHI;
Origin: < NSW-SOURCES, MCAQUEST.NLS;8, >, 14-FEB-75 17:40 CHI
;;;;####;

Documentation report for week ending 2/14

DVN 1

NSW Documentation 1a

Worked with Ann and Kirk on (25395,). Started work on DPCS by creatng a skeleton file (documentation,dpcshelp,). Had a very stimulating meeting with Ann and Bob Bellville about the Graphics help system. There are many knotty and stimluating problems about the Graphics command language and how we can help the graphics user to think about her tools. 1a1

Help/Glossary 1b

Revision of Help is finished except fr a few TNLS examples and Anne's Worked with KIRK on COM layout of Glossary in edits by KIRK and I on the tial ed of her work. We are starting wrk on the hardcopy production of the glossary. 1b1

Final Report 1c

Dick and Did a little editing, brought all our writing atleast to the draft stage. Charles and Harvey still owe writing. I have begun integration work. 1c1

Small Trailing NLS-8 Documents 1d

Preface to NLS: Waiting for Application's Review 1d1

TNLS Addressing: It is on me to repsond to RWW's review. 1d2

COM: 1e

The revised command summary awaits my attention for COM printing. 1e1

The TNLS-8 Primer awaits my attention for COM printing. 1e2

Marin Hardy's paper Microprocessing Technology awaits my attention for small revisons befor final COM run. 1e3

With Ann I made trial formats of the Network Resource Handbook and sent them to DDSI along with files to demonstrate the format library. 1e4

POOH 2

NSW Documentation 2a

Met with DVN and Kirk which led to writing (25359,) Had several

meetings with Bob, and Dirk and Bob on graphics with the hopes of beginning to ientify terms and commands and whatever that will be included in the graphics tool. In (documentation,graphics-terms,)is a beginning list that begins to define some elements of graphics. Any comments, suggestions etc. would be greatly appreciated. 2a1

Help/Glossary 2b

incorporated editorial comments from Dirk and Kirk into Help. Continued work on the TNLS examples. 2b1

Final Report 2c

read and edited one section of the final report for RWWW 2c1

Business Cards 2d

cut the red tape and the business cards are now being printed 2d1

COM 2e

worked with Dirk on formatting for COM the Network Resource Handbook 2e1

Contest 2f

met with the panel of judges to determine winner and award prize. 2f1

KIRK 3

Copy Help command
> Finished the "Copy Help (for glossary) Command in the Xprograms Helpd tool. 3a

Format Help command
> Well begun on the "Format Help" Command. 3b

Getting into the NSW % nothing written %
> A general introduction to NSW which will take the intelligent user to a point where he/she can continue to learn on her/his on with a tutorial on how to log in and call up the Editor tool. This will include such things as tip information and how to use Help. 3c

The NSW FE Help description file % nothing written % 3d

The NLS umbrella help description file. % nothing written % 3e

Documentation report for week ending 2/14

Letter tool (may be a sendmail command)	3f
Help description <kelley,task-areas,letter>	3f1
Discursive Introduction % not written % to online US postal letter generation.	3f2
Tutorial on writing and sending a U.S. postal letter. < hjournal, 25289, sending>	3f3
Sendmail tool % nothing written %	3g
Help description	3g1
Discursive Introduction to sending online mail.	3g2
Tutorial on sending mail to a person in the IDENT file.	3g3
Readmail tool % nothing written %	3h
Help description	3h1
Discursive Introduction to reading mail online.	3h2
Tutorial on reading your mail online.	3h3
Tutorial on writing, editing, and viewing a document online.	3i
very sketchy scenario at < hjournal, 25289, in>	3i1
Programs tool % nothing written %	3j
Help description file	3j1
Discursive Introduction for Cobol users.	3j2
Tutorial for [writing and] compiling Cobol programs.	3j3
Discursive Introduction for L-10 user programming.	3j4
Tutorial for writing, compiling and loading L-10 and CML programs.	3j5

DVN POOH KIRK 14-FEB-75 19:55 25403

Documentation report for week ending 2/14

(J25403) 14-FEB-75 19:55;;;; Title: Author(s): Dirk H. Van Nouhuys, Ann Weinberg, Kirk E. Kelley/DVN POOH KIRK; Distribution: /JOAN([ACTION] dirt) DIRT([INFO-ONLY]) ; Sub-Collections: SRI-ARC DIRT; Clerk: KIRK;

Oct 74 note about system-loading, service billing, usage policy

Apparently not entered into Journal at time of writing. Entered now for the record.

Oct 74 note about system-loading, service billing, usage policy

Re. LOADING & USAGE: The level of dissatisfaction with responsiveness at both ARC and OFFICE-1 machines has reached the point where I need to see better hard data and to reach a better understanding of related plans and possibilities. 1

Jim Norton told me and Dick Watson yesterday morning that he would see that: hard data were extracted from Superwatch records, that Robert Lieberman's new charter in Applications Group would cover this analysis, and that Robert would have direct responsiblity for hitting this particular analytic problem right away. 1a

I talked with Robert this morning; my understanding of his pursuit seemed to match his, except for priorities (apparently Jim hadn't had time before he left to relate to Robert his agreement to provide hard analytic figures soon). In response to our discussion, Robert expects to proceed as follows: 1b

Inform Jim Norton of his general plan and keep coordinated and in touch; 1b1

Learn basic Superwatch operation from Jeff Peters and Susan Lee (later approach Don Andrews for specialized consultation if needed); 1b2

Make his immediate priority in this analysis be on understanding enough about the situation to increase my understanding and approval of what's happening to a state satisfactory to me -- perhaps impelled by my potentially not being satisfied, further study about alernatives of usage policy, operating policy/practice, TENEX scheduler, two-NLS service, more core, etc. etc. to the point where between Jim and me is reached agreement toward effective policies or other remedial action to be taken. 1b3

I asked also to be shown whatever records of problems and dissatisfaction the Utility had experienced. Robert would ask Jim Bair for these. 1b3a

Some relevant recent SNDMSGs: 1c

J02-1259 WATSON: You're playing with Fire
Distribution: ENGELBART, NORTON
Sent: 2-OCT-74 1259-PDT 1c1

Enclosed is message from Carlson which confirms other reports that Keepp appearing from RADC and others that we can not seem to learn to not only charge high prices but give good service also in terms of response. The load

average here is now 12 and intolerable. Once more I repeat my advice beef up the memory and get a decent drum system for your Office 1 and 2 and lets stop pretending we can support all the people being loaded onto Office 1 and here or there won't be customers for any of us 1c1a

2-OCT-74 1227-PDT CARLSON at USC-ISI: OFFICE-1 RESPONSE
Distribution: NORTON AT SRI-ARC, carlson, lloyd, crain, watson at sri-arc
Received at: 2-OCT-74 12:29:12 1c1b

I WAS JUST FORCED TO LOG OUT OF OFFICE-1 AND USE TECO AT ISI FOR THE THIRD TIME THIS WEEK BECAUSE THE RESPONSE WAS SO BAD THAT I COULDN'T GET ANY WORK DONE. THE SYSTEM IS CLEARLY BEYOND THE KNEE IN THE RESPONSE TIME VERSUS NUMBER OF USERS CURVE. THAT SEEMS TO IMPLY THAT TOO MANY SLOTS HAVE BEEN SOLD. WE MUST SOMEHOW LIMIT THE NUMBER OF SIMULTANEOUS USERS SINCE I CAN ONLY CONCLUDE THAT THE SYSTEM IS NOW USELESS TO EVERYONE. 1c1b1

It
It is only fun to work on or with computers in an interactive mode when you can get some work done. Those Fortran guys are killing us and they are not NSW people (there are two on now). Discouraged Dick 1c1c

J02-1304 WATSON: Back to Q4
Distribution: ENGELBART, NORTON
Sent: 2-OCT-74 1304-PDT 1c2

Charles says lets go back to Q 4 load average of 6. Please let me know when its in effect. Dick 1c2a

J03-0611 NORTON: More Memory at Office-1
Distribution: HARDY, watson, engelbart, norton
Sent: 3-OCT-74 0611-PDT 1c3

Martin: The following sndmsg from Pollack tells us that they CAN add 64k memory for 5500/month right now at offiice-1....by Oct 14. We MUST do thiis. Please go into action...requiisiition, PD after tlking with Pollack and Floyd. RADC does NOT control the configuratin...there are too many buyers for them to do so , so i dont think the potential approval delay will effect us. If there is to be one, certainly duane stone (beside me) wiill approve it). 1c3a

Also, though this addition of memory is not the result of a study determining the optimum wat to reconfigure, ti appears to be the only quick affordable way to go. With the user

responses we are getting, the return of vacationers, the growing sophistication of use, multiple output processing, NSA coming and attitudes that demand attention and action from us WE MUST DO IT AND FAST. So go into action for me please and inform me today before 1pm yer time of the state you get it to today..or cal me at (315) 330 3857 to discuss if you want. 1c3b

Here's Pollack's sndmsg.
2-OCT-74 16:32:18,723
Net mail from site OFFICE-1 rcvd at 2-OCT-74 16:32:16
Date: 2 OCT 1974 1630-PDT
From: POLLACK at OFFICE-1
Subject: ADDITIONAL MEMORY FOR OFFICE-1
To: NORTON, NORTON at ARC
cc: POLLACK 1c3c

SUCCESS, WE CAN ADD 64K TO OFFICE-1 ON OCT 13, ON-LINE OCT 14. 1c3c1

THERE ARE CERTAIN ADVANTAGES IN HAVING MORE 10'S THAN ANYONE ELSE AROUND. 1c3c2

COST: 5500/MONTH THRU END OF CONTRACT. WE WOULD BE ABLE TO LOWER THE PRICE FOR NEXT YEAR IF YOU DECIDED TO MAKE IT PERMANENT. 1c3c3

HOW DOES THAT SOUND? I'VE BEEN A LITTLE FASTER WITH THE RESULTS THIS TIME THAN I WAS WITH THE TOTAL SYSTEMS COSTS. SORRY FOR THAT. HOPE THIS MAKES UP FOR IT. 1c3c4

PLEASE LET ME KNOW AS SOON AS POSSIBLE WHAT YOU WANT TO DO . THANKS EDWARD ------- 1c3c5

J03-0631 NORTON: fire distribution: WATSON, norton, engelbart
Sent: 3-OCT-74 0631-PDT 1c4

Playing with fire is the name of the game. 1c4a

Related topic -- SERVICE COSTS, CHARGING POLICIES FOR ARC USAGE OF UTILITY SERVICE. 2

Dick Watson's NSW budget is quite pinched, for producing the results that all parties want to see. His budget for computer resources is lower actually, on computer charges per software salary dollar, than what seems to be the IPTO "accepted level." For people used to using "exotic" facilities (speaking of the features, not the responsiveness), even this "average" would be

low. Therefore Dick is very much innerested in obtaining the most computer service for his money. I enclose relevant messages: 2a

J02-1715 WATSON: Sutherlands estimate of PDP 10 cost for NSW
Distribution: NORTON, ENGELBART Sent: 2-OCT-74 1715-PDT 2a1

Bert thinks he could offer a whole 256K machine to NSW for about 400K per year. Pieces of the machine in bulk would be proportional plus. That means the equivalent cost of a slot on a BBN run machine would be somewhere around 25K per year or 12.5K per six months. The 92.2K in the NSW budge could buy 7.5 slot equivalents at BBN versus 4.5 at 40K on Office 2. One would also expect the BBN machine to be lightly loaded after 2:00pm. The difference of 3 slots is significant increase of 66% over he 4.5. In good conscience it would be very hard if not impossible for me to ask my staff to struggle ith the lower number of slots knowing what the same amount of money would buy elsewhere. Dick 2a1a

In its current push for a business plan and an SRI-budget proposal, our Applications Group anyway will need to resolve the issues underlying the final policy we must set on service rates to ARC users, and as the Development Group's plan and budget proposal is evolved and integrated with Application's into an all-ARC plan and budget, we'll have to address the other related issues -- so, what will apparently need to be involved in resolving the NSW-project's service question are matters that anyway must be handled in the coming two weeks. It might be that we'll need to accelerate dealing with some issues to serve the commitment deadlines for NSW (and TYMSHARE??). 2b

I'm asking Dick to adopt the following approach and time scale: For the time being, assume that ARC's NSW project will contract with our Utility for its NLS services. By 18 Oct, if the arrangement doesn't seem to be converging, he would be able to take action toward other commitments. In any event, I don't want other commitments made without my foreknowledge and approval. 2c

I'm asking Jim Norton to go along with the following: I want to have a better picture painted for me of the relavent issues here. Dick and Jim will both be away next week; but I would like to have my education proceed anyway in their absence. I'd like to be free to ask for help from Bob Ratner and Robert Lieberman in relation to business plans, business analysis, and computer-systems analysis. I expect them to keep in touch with Jim Norton about what goes on, and that Jim can exercise his judgments and decisions through them in this matter. 2d

I don't expect that any decision will have to be taken before Jim and Dick return. 2d1

This particular matter is recognizeably important, but it can't be allowed to distort the whole scene, of course. For that reason, I'd like to clarify the primary issues with maximum dispatch. 2e

Oct 74 note about system-loading, service billing, usage policy

(J25404) 15-FEB-75 09:00;;;; Title: Author(s): Douglas C. Engelbart/DCE; Sub-Collections: SRI-ARC; Clerk: DCE;

Articles of potential Interest

Roger, here are two articles you may be interested in. They describe the Workshop concept and an application we have been considering. The first is The Augmented Knowledge Workshop <journal,14724,>. The second is Coordinated Information Services for a Discipline- or Mission-oriented Community <journal,12445,>. These are both rather abstract documents, but they do describe the experimental community we are building here at ARC. 1

If you are using a teletype or a non-NLS display screen, type "<L>oad <F>ile Journal,XXXXX,". Be sure to put in the final comma. 2

I hope you are enjoying your visit to England. If you get to France, send me back a brunette. 3

Articles of Potential Interest

(J25405) 15-FEB-75 09:02;;;; Title: Author(s): RaYmond R. Panko/RA3Y; Distribution: /RAH([ACTION]) RA3Y([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RA3Y; Origin: < PANKO, XXX.NLS;1, >, 15-FEB-75 08:27 RA3Y ;;;;####;

I'm not searching for a marker you ignorant machine!!

It occurs to me that the reason fast DNLS users get the annoying message "no such marker" all the time is in large part due to the fact that the algorithm for determining when a marker has been requested is backward. A marker search should only occur when the "marker shift" (right mouse button) is let up after a keyset chord made while the marker shift was down. Unfortunately, pushing the keyset BEFORE holding down the marker shift causes a marker search to occur. This has not only caused users to be slowed down and much wasted time (how do you measure such things), it is inconsistant with the way a shift button normally works. I first noticed the annoyance when KEV brought up the new mouse button algorithm a year or so ago. It appears that then the change was made. A marker search should only be initiated if the marker shift is pushed BEFORE a keyset chord and let up AFTER the chord. In the name of all those old and new users who have been frustrated and confused by "no such marker" lets agree to fix the problem. 1

I'm not searching for a marker you ignorant machine!!

(J25406) 15-FEB-75 21:51;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FEED([ACTION]) SRI-ARC([INFO-ONLY]) ;
Sub-Collections: SRI-ARC; Clerk: KIRK;

Replys Received as of Feb 16 on Complaint About Network Delays

15-FEB-75 0716-EST WALDEN at BBN-TENEX: NLS OVER THE NET TEST
Distribution: WATSON AT SRI-ARC, carlson at isi, walden
Received at: 15-FEB-75 04:17:46 1

WHEN DID YOU DO YOUR TEST? CETAINLY IT WAS NOT
A CONTROLLED TEST SINCE I (AND THEREFORE PROBABLY
THE NCC TOO) DIDN'T KNOW ANYTHING ABOUT IT. WHO KNOWS
WHAT WAS HAPPENING IN THE NET DURING YOUR TEST -- MAYBE
TWO OUT OF THREE CROSS COUNTRY LINES WERE
DOWN RESULTING IN HEAVY LOADING OF THE REMAINING ONE
AND 28 HOPS FROM TYMSHARE TO BBN. FURTHER, WHAT
WAS THE LOAD AT BBN; SWAPPING OFF THE DISK, EXPERIENCE
SHOWS THE SYSTEM HAS POOR RESPONSE WITH A LOT
SMALLER LOAD AVERAGE THAN ON A DRUM SWAP SYSTEM.
ALTHOUGH THERE WAS A LOW LOAD AVERAGE AT BBN,
WAS THERE POSSIBLY SOME USER AT BBN SENDING
TRAFFIC OUT TO THE NETWORK TO A VERY UNRESPONSIVE
RECEIVER, THUS CAUSING INTERFERENCE WITH YOUR
EXPERIMENT. 1a

LET'S DO THE EXPERIMENT AGAIN WITH SYSTEM
PROGRAMMERS WATCHING AT EVERY
STEP ALONG THE WAY (TIP, TENEX'S, NET) TO SEE
WHERE THE PROBLEM IS, IF ANY. 1b

I WOULD HAVE LIKED TO HEAR ABOUT
THIS FIRST, RATHER THAN IN A COPY
OF A LETTER TO EVERY WHEEL IN THE WORLD
BLASTING THE NET. 1c

REGARDS,
DAVE 1d

P.S., BILL, WE HAVE NO MORE PEOPLE LEFT TO WORK
ON ANY MORE CRISES THIS WEEK. 1e

P.P.S., BILL, THIS APPEARS TO ME TO BE ANOTHER
EXAMPLE OF SOMEBODY MAKING BIG PLANS WITH OUT
EVER TALKING TO US. THE
FIRST I HEARD OF NLS AT BBN WAS WHEN
I HAPPENED TO TALK TO DICK IN THE HALL AT BBN 1 AND 1/2
WEEKS AGO, AND EVEN THEN HE DIDN'T TELL
ME ABOUT THE EXPERIMENT TO WHICH
HE NOW REFERS. MAYBE THE NET HAS TO
BE RECONFIGURED SOMEWHAT TO HANDLE
NLS ACROSS THE NETWORK; MAYBE THE NLS
PEOPLE HAVE TO MODIFY IT TO MAKE IT SUITABLE
TO RUN ACROSS A NETWORK (THE NETWORK

IS NOT TRANSPARENT -- USER HABITS OFTEN HAVE
TO CHANGE). 1f

15-FEB-75 1736-EST WALDEN at BBN-TENEX: NLS OVER THE NET
Distribution: WATSON AT SRI-ARC, walden, carlson at isi
Received at: 15-FEB-75 23:36:24 2

DICK, 2a

THANKS FOR YOUR REPLY TO MY MESSAGE. 2b

I, OF COURSE, DESPARATELY WANT TO
MAKE THE NET WORK PERFECTLY AND TO HAVE YOU AND
OTHER CUSTOMERS SATISFIED. THE NET WILL NEVER
BE THE SAME AS BEING ON YOUR OWN SYSTEM (AS
I SAID IN MY PREVIOUS MESSAGE, THE NET
IS NOT TRANSPARENT), BUT (WITH
THE POSSIBLE REQUIREMENT OF SOME CHANGE IN THE
USERS EXPECTATIONS AND HABITS) I AM SURE
THAT THE NET AND THE NET SERVICE HOSTS
CAN BE MADE TO WORK TOGETHER IN A WAY WHICH
LETS WORK BE DONE OVER THE NETWORK CONVENIENTLY.
I AM WILLING TO PUT ALL AVAILABLE RESOURCES
INTO UNDERSTANDING WHAT YOU ARE CURRENTLY SEEING
AND WHAT MUST BE DONE TO FIX IT AND (TO THE
EXTENT IT IS NOT INHERANT IN THE NETWORK
TOPOLOGY OR THE HOST OPERATING SYSTEMS AND SUBSYSTEMS)
FIXING IT. HOWEVER, I CAN NOT BEGIN TO WORK
ON YOUR PROBLEM UNTIL I GET THE PRESENT PROBLEMS
(E.G., WITH OFFICE-1) SOLVED. HOPEFULLY, SOLVING
THE OFFICE-1 PROBLEM MAY HAVE FALLOUT FOR YOU.
IN ANY CASE, I THINK IT IS EXTREMELY UNLIKELY
WE CAN PARTICIPATE IN ANY EXPERIMENT TUESDAY
OF PERHAPS FOR ALL OF NEXT WEEK. IN FACT,
MEMBERS OF OUR SENIOR NETWORK
STAFF HAVE BEEN WORKING ROUND THE CLOCK
FOR A NUMBER OF DAYS NOW, INCLUDING ALL OF THIS
HOLIDAY WEEKEND. AS CARLSON SAID IN HIS MESSAGE,
ARPA IS IN CLOSE CONTACT WITH US ON THIS AND
WE WILL GET TO YOUR PROBLEM AS SSON AS WE ARE ABLE. 2c

REGARDS,
DAVE 2d

P.S., IT OCCURS TO ME TO MENTION THAT THE AVAILABLE
TERMINAL BUFFERING IN THE AMES TIP DURING YOUR
EXPERIMENT MIGHT HAVE ADDED TO THE PROBLEM;
I.E., THERE IS NOT MUCH AVAILABLE. ALSO,
THERE IS PLENTY OF INSTRAMENTATION IN THE NETWORK

SYSTEM WHICH SHOULD HELP US PIN POINT
THE SOURCE(S) OF DIFFICULTIES. 2e

15-FEB-75 1151-EST CLEMENTS at BBN-TENEXA: RUNNING NLS AT BBN SYSTEM A OVER THE NET
Distribution: WATSON AT ARC, carlson at isi, norton at arc, engelbart at arc, irby at arc,, victor at arc, clements at bbn, strollo at bbn, walden at bbn,, licklider at isi, russell at isi, lynch at sri-ai
Received at: 15-FEB-75 23:38:28 3

JUST A COUPLE OF ITEMS TO ADD TO YOUR NOTE OF LAST EVENING. 3a

THE CONFIGURATION AT BBN-TENEXA (WHERE WE HAVE BEEN TESTING)
HAS A BRYANT DRUM (IDENTICAL TO
THE ONE AT SRI-AI, I BELIEVE), WHILE THE INTENDED SERVICE SYSTEM
HAS THE 3330-EQUIVALENT DISCS. 3b

ONE EXPERIMENT WHICH COULD ADD USEFUL DATA WOULD BE SPENDING THE
PRICE OF A TOLL CALL TO ONE OF SYSTEM A'S DIRECT DATASET LINES,
ADMITTEDLY ONLY 300 BAUD, TO SEE WHAT DELAYS
ARE SEEN. THE 300 BAUD SHOULD NOT MATTER MUCH WHEN "J I" IS SENT
ONE WAY AND "UMP TO TEM" IS THE RESPONSE.
(WE DO NOT NORMALLY HAVE DIRECT DATASETS ON SYSTEM B, BUT
WE CAN PATCH ONE IN FOR A TEST THERE, TOO.) 3c

FOR PAST EXPERIENCE ON BOTH THE SHOCK OF CROSS-COUNTRY NET DELAYS
AFTER BEING USED TO LOCAL TERMINALS,
AND THE THROUGHPUT OF SWAPPING ON A DISC, THE INTERLISP PEOPLE
SHOULD BE A GOOD SOURCE. FOR EXAMPLE, WARREN TEITELMAN USED
BBN-SYSTEM-A FOR QUITE A WHILE AFTER MOVING TO XEROX-PARC.
SOME, NOT ALL, OF THE LISP WORKERS AT BBN ARE USING BBN-TENEXB
WITH THE 3330 SWAPPER. LOTS OF NUMBERS HAVE BEEN PUBLISHED ON BOTH
PROBLEMS, BUT FIRST-HAND EXPERIENCE MAY BE WORTH A THOUSAND
PUBLISHED WORDS. I FOUND THAT WORKING ON BBN-TENEX (SYS C)
WAS LESS RESPONSIVE THAN THE DRUM ON SYS A UNDER LIGHT LOAD, BUT
UNDER ANY MEDIUM TO HEAVY LOAD IT WAS QUITE AS GOOD AS SYSTEM A. 3d

I ALSO RECALL FROM MY ONE VISIT TO SRI THAT THE KEYSET USERS
RELIED HEAVILY ON THE VISUAL FEEDBACK TO ASSURE THAT THEIR KEYSET
ENTRIES WERE VALID, THUS MAKING IT DIFFICULT TO SMOOTHLY SWITCH
TO TYPING-AHEAD TO AVOID THE LATENCY OF A CROSS-COUNTRY NET.
THE THROUGHPUT IS OK, BUT THAT LATENCY MUST BE OVERCOME. 3e

FINALLY, I'LL MENTION THAT MUCH OF THAT TESTING WAS DONE LAST
EVENING
AROUND 1700 EST, AND THAT WE HAD BEEN SUFFERING ANOMALOUS BEHAVIOR
OF EITHER THE IMP OR THE NCP'S AT BBN-TENEX FOR A COUPLE OF HOURS

BEFORE THAT, THE CAUSE HAS NOT BEEN DETERMINED, BUT THIS MAY HAVE ADDED TO THE LONG FACES. WE DON'T KNOW YET.

/RCC

15-FEB-75 1219-PST CARLSON at USC-ISI: NLS OVER THE NET
Distribution: WATSON AT SRI-ARC, carlson, norton at arc, engelbart at arc, irby at arc,, victor at arc, clements at bbn, strollo at bbn,, strollo at bbn, walden at bbn, licklider, russell,, lynch at sri-ai
Received at: 15-FEB-75 23:40:59

Replys Received as of Feb 16 on Complaint About Network Delays

(J25407) 16-FEB-75 08:42;;;; Title: Author(s): Richard W. Watson/RWW; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RWW; Origin: < WATSON, NLS.NLS;1, >, 16-FEB-75 08:35 RWW ;;;;####;

Applications Organization

1

Applications Management Jim Norton

1a

Coordination and management of the following activities:

1a1

- Marketing 1a1a
- Applications Development 1a1b
- User Services 1a1c
- Computer Services - Hardware 1a1d
- Computer Services - Software 1a1e
- Client Liaison 1a1f
- Administration 1a1g
- Network Information Center 1a1h

Marketing Robert Lieberman

1b

- Coordination of marketing planning and strategies 1b1
- Stimulation and coordination of marketing efforts 1b2
- Marketing information management 1b3
- Development of Marketing materials and methods 1b4
- Preparation and production of proposals to clients 1b5
- Coordination of Applications/Development technical interaction 1b6
- Base staff: 1b7
  - Robert Lieberman 1b7a
  - (Doug Engelbart) 1b7b
  - (Jim Norton) 1b7c
  - New marketing person 1b7d

Applications Development Jim Bair

1c

- Development of instructional material 1c1
- Development of applications documentation 1c2
- Development of user-system documentation 1c3
- Development of test and evaluation methods 1c4
- Base staff: 1c5
  - Jim Bair 1c5a
  - New documentation person 1 + 1c5b

User Services Susan Roetter

1d

- Training of users and trainers 1d1
- Feedback operation 1d2
- Documentation delivery 1d3
- User ident, account, and diskspace services 1d4
- Base staff: 1d5
  - Susan Roetter 1d5a
  - Jeanne Beck 1d5b

Rita Jordan 1d5c
Sandra Johnson 1d5d
New training staff: 3+ 1d5e

Computer Services Martin Hardy (Hardware) 1e

Technical advice and services to uses relating to hardware 1e1
Interface to Tymshare and other system subcontractors 1e2
Base staff: 1e3
Martin Hardy 1e3a
Rod Bondurant 1e3b
Rene Ochoa 1e3c

Computer Services Dave Hopper (Software) 1f

Technical advice and services to uses relating to software 1f1
Maintenance of NLS software at Workshop service sites 1f2
Base staff: 1f3
Dave Hopper 1f3a
Jeff peters 1f3b
Marcia Keeney 1f3c

Client Liaison Jim Norton 1g

KWAC liaison 1g1
Technical advice and services to KWAC at each site 1g2
Base staff: 1g3
(Jim Norton) 1g3a

Administration Ray Panko 1h

Business planning (with marketing, etc.) 1h1
Business management contracts, records, reports 1h2
Base staff: 1h3
Ray Panko 1h3a
(Jim Norton) 1h3b
Joan Hamilton 1h3c

Network Information Center Jake Feinler 1i

Development and provision of NIC data bases 1i1
Hardcopy production and distribution 1i2
Base staff: 1i3
Jake Feinler 1i3a
Adrian McGinnis 1i3b

Background 2

ARC is organized into three main activities: Development, Analysis, and Applications. 2a

The development activity is responsible for the development of new or changed system features, including software, hardware and methodology domains. 2a1

The Analysis activity assists both the Development and Applications efforts at many levels and, though presently staffed at a very low level, is an essential part of the operation. Analysis is now distributed throughout the many ARC activities as required or supportable. 2a2

The Applications activity is responsible for delivering the workshop technology (as it develops) to a growing user community. The primary responsibility of the ARC Applications group is the provision of the new Workshop Utility Service. 2a3

The purpose of the Workshop Utility Service that began in January 1974 is to deliver useful advanced Workshop Utility computer and related technical services to subscribing organizations' users while concurrently providing the system developers (through Analysis) with useful information about further system development needs based on the real experiences of users in their work environments. The service is being provided to organizations that are willing to undertake exploratory use of knowledge workshop techniques through continued use of the on-line system (NLS) at OFFICE-1. 2b

The service is composed of two primary activities: computer services and technical services. 2c

The computer services are being supplied through the ARPANET to geographically distributed user groups from the OFFICE-1 computer facility maintained and operated by Tymshare, Inc. in Cupertino, California, under a subcontract with ARC. 2c1

Technical services are provided by ARC personnel in the following areas: 2c2

Maintaining and updating the "utility" version of ARC's application software (NLS). 2c2a

Supporting the user groups in learning how to use these tools, both at the individual user level and at the organizational application level. 2c2b

Assisting clients in obtaining advanced display terminal and teleprinter hardware and the necessary ARPANET connections. 2c2c

Obtaining user reactions to system features and the service itself and integrating these into the system development process. 2c2d

ARC Applications Organization and staff - February 1975

(J25408) 16-FEB-75 15:23;;;; Title: Author(s): James C. Norton/JCN;
Distribution: /KWAC([INFO-ONLY]) SRI-ARC([INFO-ONLY]) ;
Sub-Collections: SRI-ARC KWAC; Clerk: JCN; Origin: < NORTON,
APPLIC-ORG.NLS;1, >, 16-FEB-75 15:22 JCN ;;;; ####;

Working Monday 17-FEB

I still have quite a bit that I want to write. Therefore I will see you Monday after all. ...Joe 1

Working Monday 17-FEB

(J25409) 16-FEB-75 17:17;;;; Title: Author(s): Joseph L. Ehardt/JLE; Distribution: /KEV([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: JLE;

RWW 16-FEB-75 19:11 25410

more messages on network performance

16-FEB-75 1555-EST WALDEN at BBN-TENEX: NETWORK PERFORMANCE
Distribution: WATSON AT SRI-ARC, carlson at isi, walden, mckenzie
Received at: 16-FEB-75 13:00:43 1

DICK, 1a

WHILE I DON'T CLAIM THE NETWORK SOFTWARE ISN'T INSERTING
SOME UNNECESSARY DELAY, WHICH WE
ARE WORKING VERY HARD TO CHECK OUT AND FIX IF NECESSARY,
THE POINT YOU MENTION ABOUT SPLICING IN NEW IMPS
IN SERIES CERTAINLY IS A VALID ONE. AS I NOTED
TO BILL IN A PREVIOUS MESSAGE, NAC INITIALLY (ACCORDING
TO THEIR SJCC 70 PAPER) CONSIDERED A NETWORK DESIGN INFEASIBLE
(I.E., THEY WOULDN'T CONSIDER USING IT) IF THE NUMBER OF
INTERMEDIATE NODES BETWEEN ANY SOURCE AND DESTINATION
NODE WAS GREATER THAN 5. TODAY, IN A SIGNIFICANT
NUMBER OF CASES, THE NUMBER OF INTERMEDIATE NODES BETWEEN
PARTICULAR SOURCE AND DESTINATION NODES IS GREATER THAN 10! 1b

IN FACT, WE HAVE DONE A LITTLE CALCULATION ABOUT
THE CURRENT NETWORK AND HAVE LEARNED THE FOLLOWING: 1c

OVER ALL SOURCES AND ALL DESTINATIONS, THE AVERAGE NUMBER
OF NODE TO NODE HOPS A PACKET MUST TRAVERSE IS 6.47
ON THE PATH OF MINIMUM LENGTH BETWEEN THE SOURCE AND DESTINATION
(I.E., THROUGH 5.47 INTERMEDIATE NODES AND 7.47 NODES ALL
TOGETHER). IN PARTICULAR, 60 NODE PAIRS ARE SEPARATED
BY A MINIMUM OF 1 HOP, 81 PAIRS BY 2 HOPS,
104 BY 3, 124 BY 4, 142 BY 5, 171 BY 6, 170 BY 7, 169 BY 8,
139 BY 9, 104 BY 10, 65 BY 11, 32 BY 12, 16 BY 13, AND
1 NODE PAIR BY 14 HOPS. AS AN INTERESTING PARTICULAR CASE,
ARPA IS 13 HOPS AWAY FROM OFFICE-1. NOTE THE ABOVE FIGURES
INDICATE, FOR INSTANCE, A MINIMUM PATH IS AS LIKELY TO BE
10 HOPS AS TO BE 3 HOPS . 1d

AGAIN, I DON'T CLAIM THE SOFTWARE TO BE PERFECT AT THIS INSTANT,
ALTHOUGH I DO CLAIM WE CAN MAKE IT WORK WELL.
HOWEVER, THE LONG PATH LENGTHS IN THE NETWORK CERTAINLY AREN'T
HELPING THINGS. 1e

16-FEB-75 1617-EST MCKENZIE at BBN-TENEX: A Postscript to Dave's
last Message
Distribution: WATSON AT SRI-ARC, carlson at isi, walden, mckenzie
Received at: 16-FEB-75 13:19:09 2

Dick,
Incidentally, the number of hops from Tymshare (IMP #43) to
BBN-TENEX
system B or C (IMP #49) is 11 (!) hops and from Tymshare to

more messages on network performance

System A
(IMP #5) is 10 hops (assuming everything is working).
Regards,
Alex 2a

16-FEB-75 1902-PST WATSON: network configuration
Distribution: WALDEN AT BBN, MCKENZIE AT BBN, carlson at isi, watson
Received at: 16-FEB-75 19:02:51 3

Dave, Alex
the statistics you sent on node hops are quite interesting and somewhat discouraging. If delay per IMP is running between 100-200 ms than that would account for a lot of the delay we experienced. I would further guess that the East coast nodes tend to be close to each other and that the West coast nodes are close to each other hop wise, but that the East and West coast sites have grown over time to be almost partitioned from each other as new nodes have been spliced in.
I would further guess from the brief looks I have had with netwrok maps that a small number of line reconfigurations could correct the imbalance that has been growing.
Where does responsibility lie for approving reconfigurations and who watches over such things? We seem to have and east coast and a west coast net with a narrow pipe between them if I guess right rather than a national network . Do your routing algorithms tend to find the minimum path or on average is the path larger? What are recent measurements during peak loads of average delays through nodes.
I should find out from Clements what the average time for directly connected terminals is for echoing characters, and the similar statistic for chars coming in from the net. Anyway thanks again for the numbers and I really appreciate the ongoing dialog. Dick 3a

RWW 16-FEB-75 19:11 25410

more messages on network performance

(J25410) 16-FEB-75 19:11;;;; Title: Author(s): Richard W. Watson/RWW; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RWW; Origin: < WATSON, NLS.NLS;1, >, 16-FEB-75 08:35 RWW ;;;;####;

RWW 17-FEB-75 07:44 25411

More Network Delay Dialog

Thhe dialog I am having with BBN and Carlson on NetWork Delays is vital reading for Ken, Charles and Dave H. It is probably also important to Applications in preparation for the KWAC meeting this week.

More Network Delay Dialog

17-FEB-75 0737-EST WALDEN at BBN-TENEX: NLS OVER THE NET
Distribution: WATSON AT SRI-ARC, walden, mckenzie, carlson at isi
Received at: 17-FEB-75 04:39:24 1

DICK, 1a

1. IF THE DELAY PER NODE WERE 100-200 MSEC,
THAT WOULD EXPLAIN A LOT, BUT IT SHOULDN'T BE THAT HIGH; WE
ARE AND WILL CONTINUE TO BE LOOKING INTO ALL THIS.
2. REGARDING GEOGRAPHIC CLOSENESS, SOME NORTHERN SITES
ARE PRETTY FAR FROM SOME SOUTHERN SITES, AND SOME EASTERN
SITES ARE ACTUALLY PRETTY CLOSE TO SOME WESTERN SITES (E.G.,
ARPA IS NOT ALL THAT FAR FROM ISI). IN OTHER WORDS,
IT IS NOT SO SIMPLE AS YOU SUGGEST. WHAT IS TRUE IS THAT OVER
TIME THE AVERAGE MINIMUM DISTANCE BETWEEN NODES HAS
GROWN AND FOR SOME PARTICULAR NODES THE MINIMUM DISTANCE
BETWEEN THEM HAS GROWN IN THE EXTREME.
3. I BELIEVE IN CARLSON'S LAST MESSAGE TO US ALL ON THIS
SUBJECT HE NOTED THAT RUSSELL IS HAVING NAC TAKE A LOOK
AT THE NET'S TOPOLOGY AGAIN.
4. THE ROUTING ALGORITHM CERTAINLY ATTEMPTS TO FIND THE
MINIMUM PATH. WE ARE STUDYING IT NOW (I MEAN AT
THIS MINUTE PEOPLE ARE IN AT THE NCC LOOKING AT IT)
TO ASCERTAIN WHETHER THE ROUTING ALGORITHM COULD BE
FAILING AT SOME TIMES AND INSERTING UNNECESSARY DELAY. 1b

EXPERIENCE HAS SHOWN OVER AND OVER
THAT IT IS VERY UNLIKELY THAT ANY ONE THING BEING FIXED
IS GOING TO MAKE EVERYTHING ALL BETTER. MORE LIKELY,
IN MY EXPERIENCE WITH THE NETWORK, THERE ARE GOING TO BE
10 THINGS EACH CONTRIBUTING 10% TO THE TROUBLE
WHICH ARE GOING TO HAVE TO BE FIXED; FOR EXAMPLE!!!,
THE NETWORK PATHS WILL HAVE TO BE MADE
SHORTER, A BUG IN THE IMP SYSTEM WILL BE FOUND, TENEX WILL
BE FOUND TO BE NOT RESPONSIVE ENOUGH TO THE NETWORK, SWAPPING
OFF A DISK WILL BE FOUND TO BE SLOWER THAN ONE WOULD LIKE,
AT THE OTHER END THE ELF'S VDH CODE WILL BE
FOUND TO BE NOT TOO RESPONSIVE, ETC. ETC. ETC.
TO UNDERSTAND WHAT IS HAPPENING, WE MUST HAVE EVERYBODY
LOOKING AT HIS SYSTEM SIMULTANEOUSLY, OR AT LEAST,
YOU MUST HAVE US LOOKING AT OUR SYSTEM AND LOOKING AT
THE OUTSIDE EDGE OF THE END USER SYSTEMS. 1c

REGARDS,
DAVE 1d

P.S., YOU WOULD HELP ME A LOT IF YOU WOULD PUT MORE
CARRIAGE RETURNS AND LINEFEEDS IN YOUR MESSAGES. 1e

More Network Delay Dialog

17-FEB-75 0649-PST CARLSON at OFFICE-1: Your computer time
Distribution: WATSON AT SRI-ARC, carlson at isi
Received at: 17-FEB-75 06:52:35 2

1. BBN is doing all they can do about the network response.
2. If the problem is really the number of network nodes, we may want to trade some office-1 time for some BBN time.
3. Your experience doesn't sound noticably different from the service
Jim has been selling for over a year! That makes me slightly less
sympathetic than I would be otherwise. I believe that if the developers had been using the network, the user interface might be different, but not much worse.
4. Well worth a conversation. If you are at the office today, call me at home:
703-684-7527 or if busy, 703-684-8527.
Otherwise, I will call you tomorrow. 2a

Sincerely,
Bill 2b

RWW 17-FEB-75 07:44 25411

More Network Delay Dialog

(J25411) 17-FEB-75 07:44;;;; Title: Author(s): Richard W. Watson/RWW; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RWW;

DCE 17-FEB-75 11:53 25412

To Kirk re marker-call protocol, cf (25406,)

Kirk: I don't understand your point about marker calls and keyset timing, in your message (25406,) I don't see that anything has changed from the orignal algorithms for key sampling and interpreting. The keyset sampler/interpreter, since first implementation in 62, uses the algorihm of waiting until all keyset keys are up before interpreting the chord -- and it counts as part of the chord any key that was depressed since the last time they were all up. 1

There were other algorithms considered, some of which could well make for greater speed, but those alernatives that I considered would require re-conditioning of the user, and wouldn't be relevant to the issue I think you are addressing anyway. 1a

The marker-shift button on the mouse, as I just verified by trying out the different timing combinatons, works just as I understood it to all along. I.e, if a character is "inputted" while the button is down, it assumes a marker call, otherwise it assumes a bug operation. This is exactly what happens -- keyboard character entry before or after the button depression doesn't make for anomolous marker call, entry during marker-shift button depression does. And with the algorithm that the character entry time from a keyset is at the time all keys become "up", the marker-call interpretation for keyset entry is as it should be also. 2

What is it that you feel should be the algorithm(s) here for keyset samplinng/interpreting and marker-shift button action. As far as I can tell, the "No such marker" message is invoked by the user's lifting off his keyset character too soon, or too late. If users aren't aware of the keyset-entry timing (i.e. that the computer receives character entry at the time of all-keys-up), then they will tend to stumble into anomolous effects. I don't understand what is amiss otherwise. Regards, Doug 3

DCE 17-FEB-75 11:53 25412

To Kirk re marker-call protocol, cf (25406,)

(J25412) 17-FEB-75 11:53;;;; Title: Author(s): Douglas C. Engelbart/DCE; Distribution: /KIRK([ACTION]) FEED([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: DCE;

DCE 17-FEB-75 13:17 25413

Note on technique for NLS-SNDMSG use

Dick: I notice several features in your sndmsg materials about whih I can offer some technique pointers. 1

When you do an OutPut Sequential File from NLS-prepared text, toward sending that file as SNDMSG, one should use VSPECs "y" to provide inter-statement linefeeds. That apparently helps the sequential-world guys, judging from a comment by one of the BBN guys in this weekend's interchange; it also makes a lot of difference when ingesting the result back into NLS, to produce statement breaks. 2

Then, regarding the formats after ingesting back into NLS: The Message user program does better than it used to do, but it often leaves lots of annoying EOLs within what we'd like to have as NLS statements, and also doesn't break statements where it would be logical/desireable to do so. For instance, some of the SNDMSG passages that you journalized had statements that were too long to be viewed in DNLS -- no way to see the last part of them. 3

For this particular type of problem, I do a combination of things -- some passages require selective breaking into multiple statements, a human task that is quick and easy in DNLS. Also, for statements with undesired EOLs sprinkled through, I made a little user program that you may want to try (Engelbart, CR.ca,) that, when used as a Content Analyzer, will remove all EOLs in any statement that it processes. Need to be careful not to process statements where EOLs are desired, as for instance in the SNDMSG header statements. 3a

I'd like to have some technique talks once in a while. Regards, Doug. 4

DCE 17-FEB-75 13:17 25413

Note on technique for NLS-sNDMsG use

(J25413) 17-FEB-75 13:17;;;; Title: Author(s): Douglas C. Engelbart/DCE; Distribution: /RWW([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: DCE;

KEV 17-FEB-75 14:26 25414

oday i edited and placed in tasks the following files from <nls>, <nic-nls>, and where appropriate <nsw-sources>. the edits all have to do with making dnls run on standard tenex.

auxcod, bconst, dspgen, fintnls, inpfbk, nddt, psedit, utilty 1

KEV 17-FEB-75 14:26 25414

oday i edited and placed in tasks the following files from <nls>, <nic-nls>, and where appropriate <nsw-sources>. the edits all have to do with making dnls run on standard tenex.

(J25414) 17-FEB-75 14:26;;;; Title: Author(s): Kenneth E. (Ken) Victor/KEV; Distribution: /NPG([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: KEV;

KEV 17-FEB-75 14:29 25415

debugging and named blocks

ive spent about an hour and a half in the past couple of days chasing down a bug. the bug was i said repeat case 3 when i shoulda said repeat case 4 because it was hard to count levels in a listing. hopefully someday we will have named blocks to avoid this problem!!! 1

KEV 17-FEB-75 14:29 25415

debugging and named blocks

(J25415) 17-FEB-75 14:29;;;; Title: Author(s): Kenneth E. (Ken) Victor/KEV; Distribution: /NPG([INFO-ONLY]) RWW([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: KEV;

KIRK 17-FEB-75 15:54 25416

Answers to Marker Shift questions raised by DCE in 25412

Doug: I appear to be wrong about the marker-shift algorithm being changed when the new algorithm was brought up. I came to that conclusion because that's when I first started getting the unexpected "no such marker" messages. Quite simply, I think the algorithm with the keyset should be changed to work the same as it does when using the keyboard and mouse. It is not now true that if you push a keyset chord BEFORE a mouse shift and release it before releasing the mouse shift that you get the keyset chord followed by a CA. Instead you get a marker search. 1

Consider the following combinations with the Mouse Shift buttons 2

Keyset Down Shift Down Keyset UP Shift UP = Marker 2a

I think this should be changed to equal the keyset character followed by CA as follows. 2a1

Keybrd Down Shift Down Keybrd UP Shift UP = Chr, CA 2b

I think this conventional algorithm should be used consistently with the keyset as well as keyboard. 2b1

Shift Down Key Down Key UP Shift UP = Marker 2c

I think this should be the only time a marker is indicated. 2c1

If the keyset worked consistently with the keyboard in this respect, I think we would also gain by not getting so many unwanted marker searches. If all of the mouse shift buttons (besides marker shift) were changed as well, I can't imagine any change in users' habits this would caused. An important meta-point here is that in my experience most users think of the mouse buttons as standard shift buttons independant of the keyset and not as part of a single ASCII character bit specification that the "all keys up" philosophy implies. It is in fact true that you can use the mouse buttons with the keyboard and the "right thing" happens. Also note that keyset down, MShift down, MShift up, Keyset up sequence currently ignores the Mouse shift. This seems appropriate yet also inconsistant with the "all keys up" philosophy. 3

I hope this specifies more explicitly the problem I encounter. Thank you for comments and questions. 4

KIRK 17-FEB-75 15:54 25416

Answers to Marker shift questions raised by DCE in 25412

(J25416) 17-FEB-75 15:54;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FDBK([INFO-ONLY]) DCE([INFO-ONLY]) ;
Sub-Collections: SRI-ARC FDBK; Clerk: KIRK;

JAKE 17-FEB-75 19:45 25417

disaster

This is a terrible disaster of a mail
system. It asks too many questions.
If it doesn't like CRs it loses even worse!

1

JAKE 17-FEB-75 19:45 25417

disaster

(J25417) 17-FEB-75 19:45;;;; Title: Author(s): Elizabeth J. (Jake) Feinler/JAKE; Distribution: /JAKE([INFO-ONLY]) BH([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JAKE;

JLE 17-FEB-75 21:21 25418

Names of Terminal Handler Working Documents

The names of the working copies of the files that I have been editing are as follows:

(EHARDT, CLI-OSITH-WC.NLS, 1:w) and
(EHARDT, OSITH-ELFTH-WC.NLS, 1:w)

The first file describes the CLI to OSI terminal handler conventions, while the second is the one needed for the trip to ADR. ....Joe 1

JLE 17-FEB-75 21:21 25418

Names of Terminal Handler Working Documents

(J25418) 17-FEB-75 21:21;;;; Title: Author(s): Joseph L. Ehardt/JLE; Distribution: /KEV([INFO-ONLY]) ; Sub-Collections: NIC; Clerk: JLE;

KEV 18-FEB-75 08:53 25419

line printer page breaking

it would be very nice if our operations staff could ensure that there is always a good carriage tape in the lineprinter. it is extremely annoying (both when it takes so long to get listings when the system is slow, or when working off hours to take advantage of light loads) to get listings that appear to know nothing about page bounderies. perhaps the tape should be changed daily and late friday afternoon. if this is not a tape problem, then lets get the lp fixed! 1

KEV 18-FEB-75 08:53 25419

line printer page breaking

(J25419) 18-FEB-75 08:53;;;; Title: Author(s): Kenneth E. (Ken) Victor/KEV; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: KEV;

DVN 18-FEB-75 09:03 25420

SRI Standard Biography Format in NLS

Doug Forwarded 31821 to me. He suggested ARC nught have use for that format and I agreed. Could you let me know the name of the file?..Thanks 1

DVN 18-FEB-75 09:03 25420

SRI Standard Biography Format in NLS

(J25420) 18-FEB-75 09:03;;;; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /MAP2([ACTION]) JOAN([ACTION] dpcs notebook please) DCE([INFO-ONLY]) JML([INFO-ONLY]) ; Sub-Collections: DPCS SRI-ARC; Clerk: DVN;

HGL 18-FEB-75 15:55 25421

ISI Group here on Wednesday, 19 February! And YOU'RE Invited!

There will be several people from the Information Automation Project of ISI here Wednesday February 19. The morning session will be a general discussion of both the ISI IA project and status of NLS. 1

The afternoon will include several special topic discussions among small groups. The schedule is flexible and the lists below are only suggestions. If you feel anything else should be discussed, please let DSM or HGL know. 2

General meeting -- morning 3

- Discussion of current state of ISI IA project 3a
- State of NLS developments 3b
- Possible modifications to NLS for ISI 3c
- Getting new systems to ISI 3d

Special interest groups-- afternoon 4

- Virtual text 4a
- PCP callable procedures 4b
- PCP and network efficiencies 4c
- NLS new file structure 4d

HGL 18-FEB-75 15:55 25421

ISI Group here on Wednesday, 19 February! And YOU'RE Invited!

(J25421) 18-FEB-75 15:55;;;; Title: Author(s): Harvey G. Lehtman/HGL; Distribution: /NPG([ACTION]) RWW([ACTION]) DCE([ACTION]) DVN([ACTION]) ; Sub-Collections: SRI-ARC NPG; Clerk: HGL;

DVN 19-FEB-75 09:25 25422

Head Split From Body of Final Report

I have moved the headmatter (title page etc.), abstract, and introducton of the final report to (documentation,headabsintro,). This split allows the structureof the file (documenation, final,) to reflect the structure of the body of the report, i.e. chapter 1 is branch 1.

1

DVN 19-FEB-75 09:25 25422

Head Split From Body of Final Report

(J25422) 19-FEB-75 09:25;;;; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /JOAN([ACTION] dpcs and dirt noteboks please) FINAL([INFO-ONLY]) CHI([INFO-ONLY] now is your contribution comming? you are the trailing guy now) ; Sub-Collections: SRI-ARC DPCS DIRT FINAL; Clerk: DVN;

RWW 19-FEB-75 09:47 25423

New Charge Number for NSW Project

We apparantly finally have an NSW contract. The charge numbe 9229 should no longer be used. The charge number 4051 should be used for NSW work. It is important for Development people to only charge NSW for actual NSW work. Time spent on work for ISI should be charged to 4042, work on proposal formulation etc should be charged to the appropriiate overhead number as given i (24992,). If you have ay question about which account to use please see me. Since auditors are busy checking things these days it is a good idea to make a brief note on your calendar when you attend a meeting for proposal etc that is not smething in your mainstream of work. Thanks Dick

RWW 19-FEB-75 09:47 25423

New Charge Number for NSW Project

(J25423) 19-FEB-75 09:47;;;; Title: Author(s): Richard W. Watson/RWW; Distribution: /SRI-ARC([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: RWW;

DVN 19-FEB-75 14:13 25424

Letter to A. E. Tyler

Followup on 25161

Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

A.E. Tyler
Code 56030
NSWSES
Port Hueneme, California
93043

Dear Mr. Tyler:

DOug Engelbart informed me that yOu were interested in application of NLS to technical documentation. In this letter I will try to summarize what we have done in this area and some of our hopes and I will enclose relevant documentation. 1

Over the past twelve years the Augmentation Research Center (ARC) of SRI has developed a comprehensive online system (NLS) for handling textual and simple graphic information. 2

NLS provides many services for the ARC and its user community. It includes a comprehensive set of text processing capabilities but is more than just a computer text handling system. For your information only capabilities related to document production are described. 3

NLS is made uP of a number of subsystems, each serving a different function within the total NLS context. 4

The Deferred Execution (DEX) subsystem provides for preparing text offline for entry into NLS. Text may be captured on any standard terminal compatible with teletype input and recorded on paper tape, or on a keyboard device connected to a digital cassette recorder. During text capture, NLS directives may also be captured for later online processing. The structure of the text at capture defines the NLS file structure which is basically outline form. 4a

Text may also be captured online using either display NLS (DNLS) or typewriter NLS (TNLS). Both subsystems provide interactive NLS capabilities. Online capture of text tends to be more costly than offline capture but allows the user to manipulate the material as it is captured.

Processing of DEX-captured material, on the other hand, can take place during periods of low system usage, providing for better use of the system computer. 4b

DNLS and TNLS both offer the user an extensive set of text editing capabilities. DNLS employs a CRT display console and TNLS a typewriter terminal such as the TI-700. Both operate online. The command repertoires and facilities are as nearly identical as possible considering the different device characteristics. DNLS provides rather more effective user feedback, and certain operations--such as selecting a character or word in the text--are simpler with DNLS than with TNLS. The following discussion addresses the DNLS medium, but virtually all of the features described are also provided in TNLS. 4c

DNLS provides, a comprehensive set of text manipulating commands: the user can delete, replace, move, copy, transpose, or insert. Manipulations take place on naturally defined units such as characters and words as well as NLS-structured units such as statements (which may be paragraphs or phrases or lines) and groups of statements. Several techniques exist for format control. The way in which text is represented on the display (margins, character sizes, etc.) may be defined by the user. The way in which statements are numbered allows further control of formatting. 4d

One of the strongest features of DNLS is its development of display techniques. Several display devices have been used successfully by ARC, both ARC's own designs and commercially available units such as IMLAC or Hazeltine displays. The most economic display station consists of the display, a lineprocessor control unit, a mouse (a cursor device for pointing and input of some control commands), and an optional five-finger keyset (for onehanded input). Mouse, keyset, and lineprocessor were developed at ARC for interactive processing. The mouse is especially significant. It allows the user to "point" to any character on the display much more naturally than the typical four-directional, character-step cursor control of commercial units. 4e

NLS includes archival and retrieval. Once captured text has been structured into an NLS file, the system maintains storage control. While the file is active, it is stored online on disk. Inactive files are archived on magnetic tape and may be re-entered into the system upon request. 4f

NLS provides a variety of publication formats: Hardcopy of

an NLS file as it appears on a display screen may be produced on an upper/lower case line printer or directed to the Output Processor. The Output Processor is an NLS program which formats an NLS file according to instructions (directives) embedded within the text. A total of 186 directives are recognized by the Output Processor including font size, columnation, and page numbering. The Output Processor can direct output to hard copy devices such as a line printer or a production quality printer, or to a microfilm phototypesetter, where either Xerox proof copy or high-quality camera-ready masters can be generated. Complex phototypesetting can be and is accomplished in this manner by trained specialists. 4g

A utility version of NLS has evolved to support expansion of the NLS user community. This utility has been made available to a limited community for exploratory application as a multi-user, timeshared service administered by ARC. It runs on a Digital Equipment Corporation PDP-10 operating through the TENEX timesharing system, connected via an Interface Message Processor to the ARPANET or via telephone lines to service subscribers outside the ARPANET 4h

I enclose several documents giving information on the work of the Augmentation Research Center: 5

"Coordinated Information Services" by Douglas C. Engelbart, Proceedings of the Second Annual Computer Communications Conference in San Jose 7p. and "The Augmented Knowledge Workshop" by Douglas C. Engelbart, Richard W. Watson, and James C. Norton, Proceedings of the National Computer Conference in June 1973 in publications of the American Federation of Information processing, Volumne 42, New York, 1973. 19p. describes our general goals and purposes, 5a

"Online Team Environment / Network Information Center and Computer Augmented Team Interaction," Augmentation Research Center, Stanford Research Institute, Menlo Park, California 94025 16 March 1973. 178p. is our most recent general report, 5b

"Line Processor: A Device for Amplification of Display Terminal Cababilities for Text Manipulation" by Donald I. Andrews Presented at the 1974 AFIPS Conference, gives information on our current terminal technology, 5c

"Output Processor Users' Guide," Augmentation Research Center, Stanford Research Institute, Menlo Park,

California 94025 16 March 1973. 46p. shows NLS printing and formatting capabilities. 5d

and "The SRI-ARC Workshop Utility Service", by James C. Norton, ARC Journal #24031)) describes the NLS Utlity service. 5e

With respect to the availability of NLS: the current version of NLS runs on a PDP-10 using the TENEX timesharing system (see Online Team Environment page 167 ff. for a description of a typical facility). There is no difficulty making NLS available on any PDP-10 running TENEX. The possibility of operating NLS on other machines has been included in our design criteria for several years and implementation is high in our present priorities. NLS may operate through a variety of terminals. "Line Processor: A Device for Amplification of Display Terminal Cabapilities for Text Manipulation" describes the terminal arrangement that is optimal in lowering cost and giving power to the user. 6

Your interest comes at an opportune time. NLS has been developing for a long time in a research environment. It is only in the last year that, with the Utility, we have accepted the problems and opportunities of non-research use. NLS has a very wide range of applications; in developing new users we have chosen to concentrate on certain areas in an effort to create a community of people involved in development and initial applications. Document production and control is one such area. All enclosures, by the way, were produced in NLS and printed via either lineprinter or computer output to microfilm. 7

Doug suggested that I phone you after you've had a chance to think about the information I have sent. I plan to do so in a couple of weeks. If you have questions or other thoughts, please feel free to call me in the mean time. 8

Sincerely,

Dirk H. Van Nouhuys
Augmentation Research Center

DVN/joan

Letter to A. E. Tyler

(J25424) 19-FEB-75 14:13;;;; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /JOAN([ACTION] dpcs notebook please) DpCS([INFO-ONLY]) ; Sub-collections: SRI-ARC DPCS; Clerk: JOAN; Origin: < HAMILTON, DVNTYLER.NLS;5, >, 30-JAN-75 10:02 JOAN ;;;;
####;

DVN 19-FEB-75 14:22 25425

Show Marker List Puts You in a Loop.

Or at any rate you sit there runing and using time with nothing happenin on the screen. 1

DVN 19-FEB-75 14:22 25425

show Marker List Puts YOu in a Loop.

(J25425) 19-FEB-75 14:22;;;; Title: Author(s): Dirk H. Van Nouhuys/DVN; Distribution: /FEED([ACTION]) ; Sub-Collections: SRI-ARC; Clerk: DVN;

KIRK 19-FEB-75 15:00 25426

Branch name search omission on TNLS-8 cue card

Harvey points out that the TNLS-8 cue card does not have the "Branch Name" address element (a name preceeded by exclamation point). Ann, could you mark on the "correction" cue card to add this next time a card is generated? 1

KIRK 19-FEB-75 15:00 25426

Branch name search omission on TNLS-8 cue card

(J25426) 19-FEB-75 15:00;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /POOH([ACTION]) DIRT([INFO-ONLY]) ;
Sub-Collections: SRI-ARC DIRT; Clerk: KIRK;

KIRK 19-FEB-75 15:27 25427

Locator OP fix

Since no one else seems to be responsible for locator, I made the edit referred to in DVN's 25396. Jeff, could you see that a new copy gets to office-one? P.S. if any one knows how the obsolete branch for the OP-GUIDE got there in the first place, I would like to know about it. 1

KIRK 19-FEB-75 15:27 25427

Locator OP fix

(J25427) 19-FEB-75 15:27;;;; Title: Author(s): Kirk E. Kelley/KIRK; Distribution: /JCP([ACTION]) FDBK([INFO-ONLY]) DPCS([INFO-ONLY]) ; Sub-Collections: SRI-ARC FDBK DPCS; Clerk: KIRK;

the character @

when you use the character @ as a statement name, you get the message bad statement identifier. At-sign, as the alphabetic zero, is a legal character in a statement name. Because of this, links in help are not working. Thanks for your time and consideration. 1

the character @

(J25428) 19-FEB-75 15:46;;;; Title: Author(s): Ann Weinberg/POOH;
Distribution: /FEED([ACTION]) ; Sub-Collections: SRI-ARC; Clerk:
POOH;

KIRK 19-FEB-75 15:54 25429

Address expression bug

The address expression < ,frr > or < ,fr ,r > (jump to the preceeding place in my last file) doesn't work. it jumps to return in you current file and it doesn't do the ",fr". 1

KIRK 19-FEB-75 15:54 25429

Address expression bug

(J25429) 19-FEB-75 15:54;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC FDBK;
Clerk: KIRK;

JEW 19-FEB-75 16:19 25430

Second-pass L10 List Data Type Design

This issue must be decided quickly, since both PCP and NLS-backend implementations depend upon it.

Second-Pass L10 List Data Type Design

preface 1

This document is a second cut at defining a list data type for L10 and L1011; see (25133,) for the first pass. The goal is to avoid both an elaborate facility which would take considerable time and effort to design and implement, and an over-simplifed one which would be useless. 1a

I would appreciate comments/recommendations from the NLS programmers group (and anyone else who may be interested). DIA has agreed to modify the compiler in accordance with this or a better design, and I will write the run-time package. Both the PCP and NLS-backend implementations ultimately await action on this memo. 1b

Introduction 2

An L10 list is an ordered set of L10 data structures. 2a

As far as the list run-time package (LRTP) is concerned, each element of the list is either a single-word data item or the address of an allocated storage block which holds an (in general, multi-word) data item. Whenever an element of the latter type is replaced or deleted, the LRTP first releases the storage block associated with it. 2b

Associated with every list is an upper bound M on the number of elements in the list, which is assigned either at compile time, if the list is declared, or at allocate time, if space for the list is obtained via the storage allocator. At any point in time, every list is also characterized by another number L, which is the current number of elements in the list. The elements of a list are subscripted one through L. 2c

Element Manipulation 3

Replacement 3a

Assuming i <= L: 3a1

```
#list# [i] ← elem;
```
3a1a

```
#list# [i] ← @elemaddr@;
```
3a1b

replace the current ith element of list "list" with, respectively, the single-word data structure "elem" and the multi-word data structure stored in the allocated storage block (for which the LRTP thereafter assumes responsibility) addressed by "elemaddr". 3a2

For the remainder of this document, "elem" will be used as shorthand for "either elem or @elemaddr@". 3a3

Creation 3b

If i > L, the replacement operation (above) is interpreted as: 3b1

```
#list# !_ 0, 0, ..., elem;
```
3b1a

where the number of zeroes is given by: i-L-1. The append operator (!_) is described later. 3b2

Reference 3c

When used on the right-hand side of an assignment statement: 3c1

```
#list# [i]
```
3c1a

```
@list@ [i]
```
3c1b

denote, respectively, the single-word data structure itself or the address of the storage block which contains the multi-word data structure. 3c2

The latter form has the added effect of relieving the list of responsibility for the storage block (if any) associated with the element. The statement: 3c3

```
#listA# [i] _ @(@listB@ [j])@;
```
3c3a

therefore transfers responsibility for the storage block from listB to listA. 3c4

List Manipulation 4

Destruction 4a

The statement: 4a1

```
#list# _ ;
```
4a1a

sets L to zero, after first releasing any storage blocks for which the list has responsibility. 4a2

Append 4b

The statement: 4b1

```
#list# !_ elem1, ..., elemN;
```
4b1a

is logically equivalent to: 4b2

#list# [L+1] _ elem1; 4b2a

... 4b2a1

#list# [L+1] _ elemN; 4b2b

where of course each operation increases L by one. 4b3

Construction 4c

The statement: 4c1

#list# _ elem1, ..., elemN; 4c1a

is logically equivalent to: 4c2

#list# _ ; 4c2a

#list# !_ elem1, ..., elemN; 4c2b

Sublist Manipulation 5

Replacement 5a

The statement: 5a1

#list# [i, j] _ elem1, ..., elemN; 5a1a

is logically equivalent to: 5a2

#list# _ 5a2a

#list# [1], ..., #list# [i-1], 5a2a1

elem1, ..., elemN, 5a2a2

#list# [j+1], #list# [M]; 5a2a3

Reference 5b

When used on the right-hand side of an assignment statement: 5b1

"#list# [i, j]" 5b1a

is logically equivalent to: 5b2

"#list# [i], ..., #list# [j]" 5b2a

Note that therefore: 5b3

#listA# _ #listB# [i, j]; 5b3a

is logically equivalent to: 5b4

#listA# _ #listB# [i], ..., #listB# [j]; 5b4a

and NOT logically equivalent to: 5b5

#temp# _ #listB# [i], ..., #listB# [j]; 5b5a

#listA# _ $temp; 5b5b

Length Manipulation 6

The current M and L for list "list" are denoted, respectively, by: 6a

list.M and list.L 6a1

Both attributes are read-only by programmer convention. It is in general unsafe, for example, to perform: 6b

list.L _ 0; 6b1

to null a list (as one might do with an L10 string), since allocated storage blocks may be lost track of in the process. 6c

List Declaration 7

A list is declared at compile-time with a declaration statement of (for example) the following form: 7a

LOCAL LIST list [length]; 7a1

This statement creates a local variable called "list" of type LIST, and sets: 7b

M=length and L=0 7b1

The alternate declaration form: 7c

LOCAL LIST list = elem1, ..., elemM; 7c1

is exactly equivalent to: 7d

LOCAL LIST list [M]; 7d1

#list# _ elem1, ..., elemM; 7d2

Corresponding declaration statements exist of course for non-local lists. 7e

Internal Format 8

The internal PDP-10 format of a list is: 8a

XWD M,,L 8a1

XWD flag1, elem1 8a2

... 8a2a

XWD flagM, elemM 8a3

where elemi is either the value of the ith element, if representable in 18 bits, or the address of a storage block containing it, in which case the high-order bit of flagi is set. 8b

JEW 19-FEB-75 16:19 25430

Second-Pass L10 List Data Type Design

(J25430) 19-FEB-75 16:19;;;; Title: Author(s): James E. (Jim) White/JEW; Distribution: /NPG([ACTION]) SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: JEW; Origin: < WHITE, LISTDSGN2.NLS;9, >, 19-FEB-75 16:16 JEW ;;;;####;

Mark, Hans Michael, b. Mannheim, Germany June 17, 29
nat; m. 51; c. 2. Physics A.B. Calif. 1951, PHd (physics)
MIT 1954 Asst. prof MIT 58-60

Director Ames Research Center
NASA
Moffett Field CA 94035

THURSDAY, FEBRUARY 20, 1975 19:24:03-PST
THURSDAY, FEBRUARY 20, 1975 19:24:0
THURSDAY, FEBRUARY 20, 1975 19:24:03-PST THURSDAY, FEBRUARY 20, 1975 19:24:0
THURSDAY, FEBRUARY 20, 1975 19:24:03-PST THURSDAY, FEBRUARY 20, 1975 19:24:0

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<HJOURNAL>25430.NLS;1, 19-FEB-75 16:30 XXX ;;;; .HJOURNAL="JEW
19-FEB-75 16:19 25430"; Title: .H1="Second-Pass L10 List Data Type
Design"; Author(s): James E. (Jim) White/JEW; Distribution: /NPG(/
ACTION /) SRI-ARC(/ INFO-ONLY /) ; Sub-Collections: SRI-ARC NPG;
Clerk: JEW; .IGD=0; .SNF=HJRM; .RM=HJRM-7; .PN=-1; .YBS=1; .PES;
Origin: < WHITE, LISTDSGN2.NLS;9, >, 19-FEB-75 16:16 JEW ;;;;####;

.PEL; .PN=PN-1; .GCR;This issue must be decided quickly, since both PCP and NLS-backend implementations depend upon it.

Preface

This document is a second cut at defining a list data type for L10 and L10ll; see (25133,) for the first pass. The goal is to avoid both an elaborate facility which would take considerable time and effort to design and implement, and an over-simplifed one which would be useless.

I would appreciate comments/recommendations from the NLS programmers group (and anyone else who may be interested). DIA has agreed to modify the compiler in accordance with this or a better design, and I will write the run-time package. Both the PCP and NLS-backend implementations ultimately await action on this memo.

Introduction

An L10 list is an ordered set of L10 data structures.

As far as the list run-time package (LRTP) is concerned, each element of the list is either a single-word data item or the address of an allocated storage block which holds an (in general, multi-word) data item. Whenever an element of the latter type is replaced or deleted, the LRTP first releases the storage block associated with it.

Associated with every list is an upper bound M on the number of elements in the list, which is assigned either at compile time, if the list is declared, or at allocate time, if space for the list is obtained via the storage allocator. At any point in time, every list is also characterized by another number L, which is the current number of elements in the list. The elements of a list are subscripted one through L.

Element Manipulation

Replacement

Assuming i <= L:

#list# [i] ← elem;
#list# [i] ← @elemaddr@;

replace the current ith element of list "list" with, respectively, the single-word data structure "elem" and the multi-word data structure stored in the allocated storage block (for which the LRTP thereafter assumes responsibility) addressed by "elemaddr",

For the remainder of this document, "elem" will be used as shorthand for "either elem or @elemaddr@".

Creation

If i > L, the replacement operation (above) is interpreted as:

#list# |← 0, 0, ..., elem;

where the number of zeroes is given by: i-L-1. The append operator (|←) is described later.

Reference

When used on the right-hand side of an assignment statement:

#list# [i]
@list@ [i]

denote, respectively, the single-word data structure itself or the address of the storage block which contains the multi-word data structure.
The latter form has the added effect of relieving the list of responsibility for the storage block (if any) associated with the element. The statement:

```
#listA# [i] ← @(@listB@ [j])@;
```

therefore transfers responsibility for the storage block from listB to listA.

List Manipulation

Destruction

The statement:

```
#list# ← ;
```

sets L to zero, after first releasing any storage blocks for which the list has responsibility.

Append

The statement:

```
#list# ←| elem1, ..., elemN;
```

is logically equivalent to:

```
#list# [L+1] ← elem1;
   ...
#list# [L+1] ← elemN;
```

where of course each operation increases L by one.

Construction

The statement:

```
#list# ← elem1, ..., elemN;
```

is logically equivalent to:

```
#list# ← ;
#list# ←| elem1, ..., elemN;
```

Sublist Manipulation

Replacement

The statement:

```
#list# [i, j] ← elem1, ..., elemN;
```

is logically equivalent to:

```
#list# ←
   #list# [1], ..., #list# [i-1],
   elem1, ..., elemN,
   #list# [j+1], #list# [M];
```

Reference

When used on the right-hand side of an assignment statement:

```
"#list# [i, j]"
```

is logically equivalent to:

```
"#list# [i], ..., #list# [j]"
```

Note that therefore:

```
#listA# ← #listB# [i, j];
```

is logically equivalent to:

```
#listA# ← #listB# [i], ..., #listB# [j];
```

and NOT logically equivalent to:

```
#temp# ← #listB# [i], ..., #listB# [j];
#listA# ← $temp;
```

Length Manipulation

The current M and L for list "list" are denoted, respectively, by:
list.M and list.L
Both attributes are read-only by programmer convention. It is in general unsafe, for example, to perform:

```
list.L ← 0;
```

to null a list (as one might do with an L10 string), since allocated storage blocks may be lost track of in the process.

List Declaration

A list is declared at compile-time with a declaration statement of (for example) the following form:

```
LOCAL LIST list [length];
```

This statement creates a local variable called "list" of type LIST, and sets:

```
M=length  and  L=0
```

The alternate declaration form:

```
LOCAL LIST list = elem1, ..., elemM;
```

is exactly equivalent to:

```
LOCAL LIST list [M];
#list# ← elem1, ..., elemM;
```

Corresponding declaration statements exist of course for non-local lists.

Internal Format

The internal PDP-10 format of a list is:

```
XWD M,,L
XWD flag1, elem1
  ...
XWD flagM, elemM
```

where elemi is either the value of the ith element, if representable in 18 bits, or the address of a storage block containing it, in which case the high-order bit of flagi is set.

KIRK 19-FEB-75 17:10 25431

Num: ?

How come when in the calculator when I type ? it says one of my alternative commandwords is Num: but when I type n I get questionmark? 1

KIRK 19-FEB-75 17:10 25431

Num: ?

(J25431) 19-FEB-75 17:10;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC FDBK;
Clerk: KIRK;

KIRK 19-FEB-75 20:59 25432

Double duty SID

03902 appears twice as an SID in Documentation Help. Once at the statement named "connections" and again under <statement !return>. Could this a merry prank of the NLS gremlin or part of a hideous plot from Mordor? 1

KIRK 19-FEB-75 20:59 25432

Double duty SID

(J25432) 19-FEB-75 20:59;;;; Title: Author(s): KirK E. Kelley/KIRK;
Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC;
Clerk: KIRK;

RLB2 20-FEB-75 09:45 25433

Floating point operators for L10.

Operators for single precision floating point math would be very useful for to user programs written for graphics as well as the system itself. COuld we consider the addition of operators for add, sub, mul, div, fix, and float at this time before a great deal of handcoded procedures are written? 1

Floating point operators for L10.

(J25433) 20-FEB-75 09:45;;;; Title: Author(s): Robert Louis Belleville/RLB2; Distribution: /NPG([ACTION]) RWW([INFO-ONLY]) DCE([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: RLB2;

Files in my Archive Directive as of Now that I Want to Keep

Understand I can Get a personal tape to insure the transfer...?

NDM 20-FEB-75 11:23 25434

Files in my Archive Directive as of Now that I Want to Keep

<MEYER>AFCOM.NLS;2 archived on tapes 228 and 227 1

<MEYER>AFDOC.NLS;4 archived on tapes 232 and 227 2

<MEYER>AFFICHE.NLS;6 archived on tapes 234 and 233 3

<MEYER>ART-HISTORY.CBI;4 archived on tapes 183 and 184 4

<MEYER>BA110.NLS;13 archived on tapes 125 and 126 5

<MEYER>BA111A.NLS;2 archived on tapes 139 and 141 6

<MEYER>BA111B.NLS;1 archived on tapes 140 and 142 7

<MEYER>BA111C.NLS;2 archived on tapes 145 and 146 8

<MEYER>BA150.NLS;6 archived on tapes 133 and 134 9

<MEYER>BA151A.NLS;1 archived on tapes 139 and 141 10

<MEYER>BA151B.NLS;4 archived on tapes 143 and 144 11

<MEYER>BA160.NLS;3 archived on tapes 183 and 184 12

<MEYER>BA160A.NLS;4 archived on tapes 179 and 180 13

<MEYER>BA200-1.NLS;2 archived on tapes 271 and 272 14

<MEYER>BA200-2.NLS;3 archived on tapes 275 and 276 15

<MEYER>BA200-3.NLS;2 archived on tapes 263 and 264 16

<MEYER>BA200-4.NLS;3 archived on tapes 282 and 281 17

<MEYER>BA200-5.NLS;2 archived on tapes 277 and 278 18

<MEYER>BA200-F.NLS;5 archived on tapes 286 and 285 19

<MEYER>BA210-2.NLS;7 archived on tapes 276 and 275 20

<MEYER>BA210-3.NLS;3 archived on tapes 279 and 280 21

<MEYER>BA210-4.NLS;2 archived on tapes 279 and 280 22

<MEYER>BA231.NLS;2 archived on tapes 279 and 280 23

<MEYER>BA240-1.NLS;2 archived on tapes 285 and 286 24

<MEYER>BA261-1.NLS;3 archived on tapes 275 and 276 25

Files in my Archive Directive as of Now that I Want to Keep

<MEYER>BA270-C.NLS;6 archived on tapes 273 and 274 26

<MEYER>BA270-GR.NLS;3 archived on tapes 269 and 270 27

<MEYER>C001.NLS;1 archived on tapes 216 and 215 28

<MEYER>C002.NLS;1 archived on tapes 216 and 215 29

<MEYER>C004.NLS;1 archived on tapes 216 and 215 30

<MEYER>C005.NLS;1 archived on tapes 216 and 215 31

<MEYER>C006.NLS;1 archived on tapes 216 and 215 32

<MEYER>C007.NLS;1 archived on tapes 216 and 215 33

<MEYER>C008.NLS;1 archived on tapes 216 and 215 34

<MEYER>C009.NLS;1 archived on tapes 216 and 215 35

<MEYER>C010.NLS;1 archived on tapes 216 and 215 36

<MEYER>C011.NLS;1 archived on tapes 216 and 215 37

<MEYER>CASCADE.NLS;3 archived on tapes 221 and 222 38

<MEYER>CBI.NLS;14 archived on tapes 183 and 184 39

<MEYER>CONSTITUTION.NLS;3 archived on tapes 188 and 187 40

<MEYER>HOUSE.NLS;4 archived on tapes 223 and 224 41

<MEYER>JPRINT.NLS;21 archived on tapes 172 and 174 42

<MEYER>NIM.BAS;3 archived on tapes 153 and 154 43

<MEYER>SHAREN.NLS;5 archived on tapes 177 and 178 44

<MEYER>STANFORD-PLAN.NLS;10 archived on tapes 275 and 276 45

<MEYER>STANFORD.NLS;13 archived on tapes 273 and 274 46

<MEYER>SUICIDE.NLS;5 archived on tapes 165 and 166 47

<MEYER>SYSGDFORM.NLS;17 archived on tapes 196 and 195 48

<MEYER>SYSGDINDEX.NLS;3 archived on tapes 167 and 168 49

<MEYER>SYSGDINDEX.REL;1 archived on tapes 165 and 166 50

Files in my Archive Directive as of Now that I Want to Keep

<MEYER>USERPROC.NLS;17 archived on tapes 199 and 200 51

<MEYER>VSCARD.NLS;6 archived on tapes 274 and 273 52

<MEYER>XUP.NLS;2 archived on tapes 218 and 217 53

NDM 20-FEB-75 11:23 25434

Files in my Archive Directive as of Now that I Want to Keep

(J25434) 20-FEB-75 11:23;;;; Title: Author(s): N. Dean Meyer/NDM;
Distribution: /RCO([ACTION]) JCP([ACTION]) ; Sub-Collections:
SRI-ARC; Clerk: NDM; Origin: < MEYER, ARCH.NLS;4, >, 20-FEB-75
11:17 NDM ;;;;####;

CHI 20-FEB-75 18:04 25435

re 25433; floating point operators for L10

Adding floating point variables to L10 would be extremely nice for writers of user programs that deal with real numbers (like dollars). DCE and I once discussed the addition of these to L10 but I have not followed through. For user programs, one would also like a subroutine or other system featurY that could convert a text string in an NLS file to a real variable and vise-versa. This seems to be mostly a matter of how best to use DIA's resources. As with the LIST data type needed for PCP, perhaps RLB2 could design and implement the runtime support and DIA could add what is necessary to the compiler to support it. The decision rests with RWW. 1

CHI 20-FEB-75 18:04 25435

re 25433; floating point operators for 110

(J25435) 20-FEB-75 18:04;;;; Title: Author(s): Charles H. Irby/CHI;
Distribution: /RWW([ACTION]) SRI-ARC([INFO-ONLY]) ;
Sub-Collections: SRI-ARC; Clerk: CHI;

KIRK 20-FEB-75 18:18 25436

Bug in Process Commands

After saying "Execute Useroptions " in a command branch, "Startup startup" results in the Show All to appear. Placing an extra space in front of "Startup" will cause it to work. This indicates that after an Execute command, the Process Commands command reverts to Terse Recognition mode. This is a very confusing bug as everywhere else, Demand Recognition mode is required. 1

KIRK 20-FEB-75 18:18 25436

Bug in Process Commands

(J25436) 20-FEB-75 18:18;;;; Title: Author(s): Kirk E. Kelley/KIRK;
Distribution: /FDBK([ACTION]) ; Sub-Collections: SRI-ARC FDBK;
Clerk: KIRK;

CHI 20-FEB-75 18:26 25437

Re 25430; L10 List data structure

Jim, The description of lists in 25430 leaves me with a fYw questions:
1) is the type of each element stored as part of the left halfword?
2) Can an element of a list be a list? If yes (which I assume) then the @...@ notation must allow for structures that may contain allocated storage, right?
3) why not use string construction syntax as a model? thus #list#[a TO b] and #list# ← #list#, appended stuff;

We should talk more about this. Charles. 1

CHI 20-FEB-75 18:26 25437

Re 25430; L10 List data structure

(J25437) 20-FEB-75 18:26;;;; Title: Author(s): Charles H. Irby/CHI; Distribution: /JEW([ACTION]) NPG([INFO-ONLY]) RWW([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: CHI;

CHI DSM 21-FEB-75 03:25 25438

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

Sent via sndmsg to Millstein and Balzer@ISIB

CHI DSM 21-FEB-75 03:25 25438

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

Bob, this is a list of questions we have so far. This memo reflects our understanding of answers to some questions (based on recent convesations) and suggested answers to others. Hope this helps you undersand what we need to know about the WM and helps you get it documented. 1

NSW Version Number 2

Since the capabilities made available by the FE and the WM will undoubtedly change in slight ways over time, we suggest that both the FE and WM make available a function or data store that contains a version number which can be used by tools to determine what capabilities they should attempt to use. 2a

General File System Questions 3

We are assuming that elements of a file name are strictly ordered, thus a,b and b,a are different files. Furthermore we are assuming that this implies a hiearchical file structure with access rights to each level impling access to all lower levels. Thus if i have a key to the cabinet/drawer/folder called a,b I automatically have access rights to a,b,c and a,b,d and a,b,... 3a

Are file attributes such as filetype actually a part of the file name? That is can i have a file named a,b which is a Fortran source file and another file also called a.b which is a 360 object file? 3b

NSW File Attributes 4

We would like the WM to store at least the following attributes with each NSW file. 4a

file name - CHARSTR 4a1

File Type - CHARSTR 4a2

Specifies the PCP encoding to be used to move the file around the NSW. This attribute specifies the physical structure of the file, for example: sequential text file with fixed size records, sequential text file of one record, binary sequential file, binary random file with holes. 4a2a

Use type - CHARSTR 4a3

specifies the semantic use of the file.For example NLS file, B4700 object file, etc. A given use type probably implies a physical file type. 4a3a

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

account number - CHARSTR 4a4

access controls - 4a5

(it is our understanding that access control is provided via Key and Key rings which belong to a user/project pair) 4a5a

size units - CHARSTR 4a6

size - INTEGER 4a7

in "size units" units 4a7a

Locked - BOOLEAN 4a8

Lockee - CHARSTR 4a9

This could be the individual identification character string (ident) or the user-i.d. 4a9a

creator - CHARSTR 4a10

This could be the individual identification character string (ident) or the user-i.d. 4a10a

Last read date - CHARSTR 4a11

Last Write Date - CHARSTR 4a12

Last Writer - CHARSTR 4a13

Last Reader - CHARSTR 4a14

creation date - CHARSTR 4a15

Please describe in detail the following File Primitives: 5

OPEN - Makes an NSW file available to a local tool, i.e. copies the file into a local file space (a directory associated with the tool process). 5a

Arguments as specified in Millstein's WHITE BOXES preliminary list , see (HJOURNAL,25383,) 5a1

TPH - INTEGER 5a1a

This is a pointer to the Interactive Tool Descriptor

which describes the legal file attributes for intput to and output from this tool. 5a1a1

Question: Is this simply the PCP Process handle ? If so why does the back end need to pass this since the WM will always know the process handle of the caller. This same question also applies to the DELIVER and WARRANT procedures. 5a1a2

Inputcode - INTEGER (?) 5a1b

We are not sure of the semantic meaning of this argument. Is this an encoding of the use type of the file? IF so it probably replaces the suggested filetype and usetype below. 5a1b1

Filespec - CHARSTR 5a1c

Question: How is scope for filenames established? Is this accomplished inside of the Back End by appending a string (current scope) to front of the file name, or will the WM provide a primitatve like 5a1c1

SETCURRENTSCOPE(Scope) 5a1c1a

Where Scope is a CHARSTR will the WM to which the WM will append all succeeding file names which come from the process, thus establishing a current scope for the process? 5a1c1a1

We are assuming that throughout this document arguments called "Filespec" are file names with implicit scope, i.e. file names to which the WM will append the current scope while arguments called "Filename" are full nsw file names with no implicit scope. 5a1c2

Qhelp -BOOLEAN 5a1d

indicates whether help returns are to be referred to the FE or not. 5a1d1

Suggested additional arguments (possible extensions to white boxes) 5a2

lock - BOOLEAN 5a2a

if true then lock this file, i.e. don't allow any other user's to lock the file. We would like the ability to

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

OPEN a file without locking it, i.e. open it read only. Of course a file opened in this mannar cannot be DELIVERED back to the WM unless it is first locked by the tool, see SETSEMAPHOR below. 5a2a1

filetype - INTEGER/EMPTY 5a2b

EMPTY implies use the physical file type associated with the file by the WM. 5a2b1

INTEGER implies produce a local file of the given physical file type invoking appropiate conversion algorithm if necessary and possible. This kind of automatic conversion may be a second year feature. 5a2b2

usetype - INTEGER/EMPTY 5a2c

EMPTY implies use the use type associated with the file by the WM. 5a2c1

INTEGER implies produce a local file of the given use type invoking appropiate conversion algorithm if necessary and possible. This kind of automatic conversion may be a second year feature. 5a2c2

Return Arguments 5a3

localfilename - CHARSTR 5a3a

nswfilename - CHARSTR 5a3b

Question how does this differ from the "Filespec" which was passed?We assume that the difference is that the scope has been added by the WM 5a3b1

DELIVER - replaces an existing NSW file by a local file and thereby unlocks the NSW file. Only legal if user has the NSW file locked. 5b

Arguments as specified in Millstein's WHITE BOXES Preliminary list , see (HJOURNAL,25383,) 5b1

TPH - INTEGER 5b1a

This is a pointer to the Interactive Tool Descriptor which describes the legal file attributes for intput to and output from this tool. 5b1a1

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

Question: Is this simply the PCP Process handle ? If so why does the back end need to pass this since the WM will always know the process handle of the caller. This same question also applies to the DELIVER and WARRANT procedures. 5b1a2

Outputcode - INTEGER (?) 5b1b

We are not sure of the semantic meaning of this argument. Is this an encoding of the use type of the file? IF so it probably replaces the suggested filetype and usetype below. 5b1b1

Localfilename - CHARSTR 5b1c

Filename - CHARSTR 5b1d

Qhelp -BOOLEAN 5b1e

indicates whether help returns are to be referred to the FE or not. 5b1e1

Suggested additional arguments (possible extensions to white boxes) 5b2

It seems that the tool must specify some of the files attributes at this time. Perhaps they are all encoded in the argument Outputcode. The attributes which need specification are filetype , usetype and probably also sizeunits and size (unless the WM can compute these somehow during the file transfer). 5b2a

Return Arguments 5b3

nswfilename - CHARSTR 5b3a

Question: How does this differ from the filename which was passed? does it have the current scope added? 5b3a1

CREATE (suggested new WHITE BOX) 5c

Arguments and return arguments are identical to DELIVER. Function is identical to deliver with the following exceptions: 5c1

CREATE will fail if there alredy exists an NSW file file with the same name and attributes. 5c1a

CREATE leaves the created file locked by the creator unlike

DELIVER which releases the lock.Create also causes the WM to save the local file name associated with this NSW file as the local backup , see CLOSE below. 5c1b

CLOSE (suggested new WHITE BOX) 5d

This primitive represents one possible way of achieving the goal of maintaining file integrity across TBH crashes. It also provides the ability to edit a file and logout and continue editing the file in a succeeding session without losing the ability to regain the unedited version of the file. The basic idea is when a file is closed the WM saves the local file name as an uncompleted edit of the base file. Thus on any succeeding OPEN request on the base file the WM would first check to see if this user has an uncompletely edited version of the file anywhere and hand back this local name instead of a fresh copy of the base file. It provides users a way of saving edits across sessions without destroying the uneditied version. 5d1

Hopefully CLOSE would not involve moveing or copying the file but would rather associate the local file name with the NSW file as this users latest state of the file. When the TBH crashes and comes up again the user simply asks for the NSW file via an OPEN request and the WM returns the local file name. Note that it may be necessary for the WM to move/copy these local files from the local name space of the process when the process is deleted and save them somewhere else for the user. If this happens the WM must save the new location of the file and move this file to the users local space when he OPENS the base NSW file. 5d2

Arguments 5d3

Localfilename = CHARSTR 5d3a

Filespec = CHARSTR 5d3b

Return arguments 5d4

None except error conditions. For example it is an error if this user does not have Filename locked. 5d4a

Create new version of a file 5e

Is there the concept of versions of a file in the nsw? Can a user get at earlier versions of a file? What sorts of file backup are you planning to support? What does the user do to

get back a copy of a file from last week (if, say, today's copy is bad for some hardware or software reason)? 5e1

NSW will not support version numbers of a file. At least not in the first years implementation. 5e2

COPY(userid, Filespec, Filename) 5f

Returns: 5f1

Full NSW File name (source) 5f1a

Full NSW File Name (destination) 5f1b

RENAME(userid, Filespec, Filename) 5g

Returns: 5g1

Full NSW File name (source) 5g1a

Full NSW File Name (destination) 5g1b

Lock/unlock File 5h

Assuming user has delete access to the file. What can we store with the lock? User-id? Individual-id? User-name? Project name? 5h1

SETSEMAPHOR(Userid, Filespec) 5h2

locks file provided user has replace access to file. 5h2a

UNSETSEMAPHOR(Userid, Filespec) 5h3

Is File Locked 5i

In addition to yes/no, what can we get back? User-id? individual-id? user-name, project name? 5i1

What is needed is a general way of retrieving and setting file attributes. Proposed new WHITE BOX 5i2

GETATTRIBUTES(Attrbibutenames) 5i2a

Attributenames - LIST(CHARSTR,,,,) 5i2a1

Return Attrinutevalues - LIST (CHARSTR/INTEGER, ,,,,) 5i2a2

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

SETATTRIBUTE(Attributenames,Attributevaluues) 5i2b

This is an extension to the WARRANT Function, Discussion is needed concerning attributes in general and who can write attributes when in particular. 5i2b1

BAck up one version for File 5j

Not supported in first year NSW 5j1

Delete file 5k

DELETE(Userid, FIlespec) 5k1

Returns Full NSW file name as a CHARSTR 5k1a

Undelete file 5l

Will you support this? 5l1

NO not first year NSW 5l2

Expunge deleted File 5m

Permanently reclaims storage space. 5m1

Also not supported in first year NSW 5m2

Archive File 5n

Are you going to make an archival service available to the nsw users? This is not the same as a file backup system, which we assume you are providing to insure file system integrity. This archival service allows user to store away files on a semi-permanent basis for later use. 5n1

Suggested implementation 5n2

ARCHIvE(userid, Filespec, Delete) 5n2a

Archives the specified file and then deletes it if the BOOLEAN delete is TRUE. 5n2a1

Retrieve File from Archive 5o

Suggested implementation 5o1

INTERCGATE(userid, Filespec) 5o1a

Returns True if file is archived false otherwise 5o1a1

RETRIEVE(userid, Filespec, Filename) 5o1b

Retrieves the file Filespec from the archive as stores it as Filename, Returns full NSW file name of Both the Archived file and the file under which it is stored 5o1b1

Trim Directory 5p

Allow user to delete all but highest N (user specified) versions of the files in his current working directory. 5p1

Not supported in first uear NSW 5p2

File Access 6

Some special system-level tools (Journal, Sndmsg) need read, write, or append access to certain files belonging to all users. How do we implement the Journal background delivery process? What special capabilities will you provide which will let it write on files belonging to other users? 6a

In our current implementation of the Journal, the user tool, Sendmail, creates a file containing the mail specifications in a fixed directory to be processed by the delivery process. The delivery process is a privileged system process and may write on files belonging to all users. 6a1

In the NSW we assume that the Journal Delivery process will exist at all times, that it will have keys to the in-basket files of all users, and that it will periodically (say, every 15 minutes) probe the file system (the WM) for the existence of new files in all user's space with a certain file name (field or attribute) that designates it as mail to be delivered (out-basket files) by the delivery process. Initially, the in-basket files will be NLS files, although later a variety of in-basket files could be supported. 6a2

Use Types or Attributes 7

What are the currently defined use types? Are they the same as structure types (if so are sequential text files that use different conventions for their format have different structure types?) How are new ones introduced? How are they specified in open-file and other primitives (do we use warrent?)? What conversion routines do you think we are writing? Will you automatically invoke conversions if the use type of the open

request does not match the use type of the file and the conversion exists or do you expect the tools to invoke the conversions themselves (and if so, what about old tools?) 7a

We feel that at the time of the open you should come back with a help return indicatinf that the file is of the wrong use type and that there is or is not an allowed conversion. If there is an allowed conversion, the tool should be able to resume your help and get it converted. 7a1

We fully expect that the conversion mechanisms will not work this transparently in the first system. The user will doubtlessly have to ask the tool do convert files for him. 7a2

List Filenames 8

List filenames for a user, a project, and any element of a filename, including usetype (which we assume is an attribute). 8a

File status information (attributes and semaphor locks) should be optionally included in the list. 8a1

Creation date 8a1a

Last read date 8a1b

Last write date 8a1c

Creator, last writer, last reader 8a1d

Size (in what units?) 8a1e

Any special access controls 8a1f

Locked (by whom and when) 8a1g

File Name Recognition 9

What is the primitive that does filename expansion and how is it called? 9a

By the way, based on our accumulated user experience, your inability to complete partially specified fields of filenames seems a serious deficiency from the user's point of view, since it does not allow him to type part of a field and ask that the rest of the name be recognized. Many users will only deal with one field of the file name, using scope control (working directory) to do the rest. For these users you are providing

no file name recognition at all! We hope you will reconsider this limitation. 9a1

We understand that you have decided that files will consist of ordered fields. Thus a,b is never the same as b.a. 9b

Work files 10

Should work files (such as sendMail uses) be NSW files or purely local files? If they are local, how hard is it to enter them into the NSW? 10a

We assume that the SendMail work file will be an NSW file and that your DELIVER primitive is used to convert a local file to an NSW file. Will we have to use WARRENT also? 10a1

Frontend Needs 11

What does the RUNTOOL primitive do and what are arguments and results? 11a

We expect that RUNTOOL will do the following: 11a1

Take as input, the user-id returned from LOGIN, toolname (either a string or an integer), and an optional filelist and return (starting immediately perhaps as a file transfer) the tool grammar and (later) the tool-id and the list of process handles for the PCP processes created for this tool or a failure return indicating that the user is not allowed access to this tool. Since, in general, there will be only one process handle it can be returned as an integer instead of as the single element of a list. 11a1a

It will determine the list of processes to create for the tool by examining the grammar or its own internal descriptor for this tool (no one cares as long as the tool perveyer can easily change the process configuration and process names). It will introduce the FE and the tool processes and it will call the BEGNSW procedure within each created process. An optional file list can be supplied as an argument to RUNTOOL, but NLS does not intend to use this initially and we do not understand how the file list is passed on to the tool. 11a1b

Get grammar for a tool given tool-id supplied by runtool. 11b

Once a tool has been started for a user, it may be necessary for the FE to ask for the grammar again. This would only

happen if the user slued to another tool and no other user was sharing the grammar and the FE needed space for another grammar. The grammar should be delivered to the FE in the same form as with RUNTOOL. 11b1

It may also be necessay for the help process to access the grammar to better help the user, although we do not intend to do this initially. 11b2

Get user profile for FE, given user-id supplied by LOGIN. 11c

The help process may need to obtain the user's interaction profile in order to properly construct examples for the user. 11c1

Login primitive args and results. 11d

The LOGIN primitive should be of the form 11e

LOGIN(project, user, password -> user-id, User-Profile, tool-list, have-message, systemmessage) Where 11e1

project, user, and password, are CHARSTR 11e1a

systemmessage is CHARSTR/EMPTY 11e1b

user-id is an INTEGER 11e1c

user-profile is a BITSTR 11e1d

(differnet bitstr for FE running in PDP-10 and PDP-11) 11e1d1

tool-list is LIST (LIST(%user-tool-name% CHARSTR, %unique tool number% INTEGER), ..., %entry tool index%(INTEGER/EMPTY)) 11e1e

havemessage is a BOOLEAN (TRUE means tell user he has new mail) 11e1f

[How does Journal background delivery process set this boolean?] 11e1f1

This procedure will do a failure return if any of the perameters are incorrect or if the caller is not a valid FE process. We do not want to make it easy for an unqualified user to keep retrying login until he guesses a correct triplet. 11e2

Logout 11f

This is of the form LOGOUT(user-id => cost) where 11f1

cost is LIST (%Dollars% INTEGER, %cents% INTEGER). 11f1a

This procedure deletes any outstanding processes created on this user's behalf. It also, if necessary, copies the user's files from local file spaces into its own favorite storage locations. Any local files that it does not know about will be lost. Please note, this assumes that a tool can call DELIVER without losing the right to continue manipulating a local file. This allows a tool to create a local file, use deliver to give it NSW status and name, and still manipulate the file. This imples either a) a primitive, called CLOSE say, that tells NSW it may now move/copy the file to a safe place if it wants to or b) that this is not done until the process is deleted. After a TBH crash, the WM is expected to remember files that were DELIVERed to it. 11f2

Terminate tool given tool-id or all tools 11g

This is of the form ENDTOOLUSE(user-id, (tool-id/EMPTY) => cost). It deletes the processes that were created to support the specified or all tool(s) and reports the usage cost. 11g1

What are special file names for local printer, card reader, tape drive? 11h

Is there a relog primitive? 11i

We assume that your REATTACHTONSW (project, user, password => see login) can be used as a shorthand for a logout-login sequense as well as in crash recovery of the FE. 11i1

Is there a primitive to find out who else is currently using the NSW? What about finding out if a particular user is loged on and where (FE, terminal number)? 11j

This will be necessary for terminal linking and is a generally useful feature. We suggest the following: 11j1

WHO(project => user-list) where 11j1a

user-list is CHARSTR of the form 11j1a1

user1 FE# terminal#
user2 FE# terminal#
.

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

.
. 11j1a1a

WHERE(user => where-list) where 11j1b

where-list is CHARSTR of the form 11j1b1

project1 FE# terminal#
project2 FE# terminal#
.
.
. 11j1b1a

How are background processes such as the Journal delivery process started up? Will the WM do it or should they come up with the host like the WM and FE? 12

We assume this will come up with its host like the FE and WM. Such a process must attach itself to the WM just as FE's will do. 12a

Get an Individual-id ID: an integer (starting at 1 -- at most 21 bits for now) plus a Character string individual-string (max 50 characters, say) 13

We assume that user-id returned by LOGIN is for user-project pair. We need the following: 13a

Gven user-id get the unique Individual-id and Individual-string for the person so tools can get files containing individual-specific data. The names of such files would presumably be computed fromthe Individual-id and/or Individual-string. 13a1

Given the Individual-id, get the Individual-string 13a2

Given the Individual-string, get the Individual-id 13a3

Note: Eventually we will need much more information about an individual from the WM, e.g. mail-in-basket file or process-package-procedure, U.S. mail address, telephone number, etc. 13b

Get the NSW date and time. The time should be the same for everybody, properly converted for the frontend's time zone. 14

We may eventually also be able to convert time for users coming in through TIP's, but not initially. 14a

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

Create a New tool 15

What steps are involved in creating a new nsw tool? How is the grammar installed? The help data base? the list of processes to create to support this tool (will this be read from the grammar?)? How are tool access rights given out? Do some people have an attribute of tool-creator and others can't do this? Can any user create new tools that only he can run? 15a

We suggest that there be a special tool (built in second year by MCA) that interacts with tool installers and creates appropriate data bases, table entries, etc for a new or updated tools. We also suggest that tool grammars and user interaction profiles be stored as files and that there be two sets of these files,one for FE's running in PDP-11's and one for FE's running in PDP-10's. This requires additional processing at creation time for these data structures but makes loading them into the FE much more efficient. 15a1

Will the WM provide a primitive to store user interaction profiles or will there just be a file-naming convention based on individual-string/id? 15b

Create a sub-tool 16

This is similar to the create tool questions, except that an already created (for this user) process is used (please refer to CHI's memo on user programs). What, if any, problems exist here? 16a

If a grammar wants to use an existing process the WM should not create a new process if an instance of the desired process already exists. 16b

When several grammars are using the same instance of a process we would like the WM to maintain a use count for that process, and delete the process only when it's use count goes to zero. 16c

A project leader should be able to allow his people to create and run user programs without incuring the overhead of installing new tools. 16d

How does one allow other people access to tools, user programs, files, working directories? 17

How does one get accounting information for himself, another User, Project, etc. 18

Crashes: how do we save the state of a user's active (local) files?

e.g. if the system crashes while he is editing how much will he loose? 19

Please note that loosing the state of local files if a TBH crashes is quite unacceptable from our point of view. We have worked hard to make NLS files as crash resistant as we can. An NLS user now seldom looses more than the edit he was making at the time of the crash. We have worked hard to gain this and will not give it up easily. 19a

Batch tool questions. 20

How is a user notified when his batch job is completed? 20a

If the WM knows that a batch job has completed for a user and that user is online, it should call his FE's SHOW-STATUS-MESSAGE primitive specifying the appropriate user-id and a message telling him of the completion. 20a1

How does a user writing his own JCL specify nsw file names? 20b

Our understanding from Muntz's overview document is that this will not be possible for July-75 system. The user will have to copy the files to the batch host first and use the local names in his jcl. Is this correct? What are your thoughts for future releases? 20b1

What sort of JCL will be available ? Will there be several virtual types of JCL which in turn map into machine dependent JCL? How does the user interact with this tool? 20c

CHI DSM 21-FEB-75 03:25 25438

Our Current Understanding of the NSW Works Manager with Questions and Suggestions.

(J25438) 21-FEB-75 03:25;;;; Title: Author(s): Charles H. Irby, David S. Maynard/CHI DSM; Distribution: /NPG([INFO-ONLY]) RWW([INFO-ONLY]) WEC([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: DSM;

NDM 21-FEB-75 17:22 25439

Content Analyzer Filter: Show only text before double-asterisk; do not edit file.

If doesn't find double-asterisk, won't show.

NDM 21-FEB-75 17:22 25439

Content Analyzer Filter: Show only text before double-asterisk; do not edit file.

```
FILE strip % (110,) (meyer,strip,ca,) %                                    1
   (strip) PROCEDURE (sw) ;                                               1a
      LOCAL TEXT POINTER ptr1, ptr2 ;                                     1a1
      LOCAL STRING ststr[2000] ;                                          1a2
      REF sw ;                                                            1a3
      IF FIND ^ptr1 SF(ptr1) ^ptr1 ["**"] < 2CH sNP > ^ptr2 THEN          1a4
         BEGIN                                                            1a4a
         *ststr* _ ptr1 ptr2 ;                                            1a4b
         send (&sw, $ststr) ;                                             1a4c
         END;                                                             1a4d
      RETURN(FALSE) ;                                                     1a5
      END,                                                                1a6
   FINISH                                                                 1b
```

NDM 21-FEB-75 17:22 25439

Content Analyzer Filter: show only text before double-asterisk; do not edit file.

(J25439) 21-FEB-75 17:22;;;; Title: Author(s): N. Dean Meyer/NDM; Distribution: /DAP([INFO-ONLY]) JCN([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: NDM; Origin: < MEYER, STRIP,NLS;3, >, 21-FEB-75 17:19 NDM ;;;;####;

DSM 21-FEB-75 22:24 25440

It's a BOY !

WOW

DSM 21-FEB-75 22:24 25440

It's a BOY !

As the sun entered Pisces on Friday February 21 a Pisces son entered our family. Jordan David was born at 1:55 P.M. weighing in at 7 pounds 7 ounces and measuring 19 inches. Mother and Child are both recuperating beautifully. 1

DSM 21-FEB-75 22:24 25440

It's a BOY !

(J25440) 21-FEB-75 22:24;;;; Title: Author(s): David S. Maynard/DSM; Distribution: /SRI-ARC([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: DSM;

JAKE 22-FEB-75 14:40 25441

FANTASTIC!

Dear Dave,
Bet you are both very happy about your new son...of course being a Pisces puts him in the same boat with people like Einstein and Nurgeyev and Harvey and myself...obviously one of the better signs of the Zodiac. Trust everyone is doing OK...my very best wishes to you all.
Love, Jake

1

JAKE 22-FEB-75 14:40 25441

FANTASTIC!

(J25441) 22-FEB-75 14:40;;;; Title: Author(s): Elizabeth J. (Jake) Feinler/JAKE; Distribution: /DSM([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JAKE;

DSM 23-FEB-75 22:33 25442

ARC Development Group Disk Directories

The file (nsw-sources,directories,1:x) contains a snapshot of the disk directories of the ARC machine taken last January 22. I have attempted to indicate which of these directories we will need to be transferred to BBN in March. Please look this over to be sure it is complete. Additions, deletions, and changes in category should be made to this working file. Thank You.

1

DSM 23-FEB-75 22:33 25442

ARC Development Group Disk Directories

(J25442) 23-FEB-75 22:33;;;; Title: Author(s): David S. Maynard/DSM; Distribution: /NPG([ACTION]) DVN([ACTION]) POOH([ACTION]) RWW([INFO-ONLY]) JCP([INFO-ONLY]) ; Sub-Collections: SRI-ARC NPG; Clerk: DSM;

JAKE 23-FEB-75 23:36 25443

PI-Write-up, Abbott

RISOS PROJECT
1974 ARPA Project Summary

Prepared for: ARPA IPT Principal Investigators Conference
San Diego, Mar. 12-14, 1975

Prepared by: Robert P. Abbott
Lawrence Livermore Laboratory
Box 808 L-307
Livermore, California 94550

The program's initial intent was to provide a group which is capable of examining any operating system (O/S) for integrity flaws. The group has evolved into what is better described as an audit team in that a given problem in an O/S may or may not be regarded as a security breach depending on the environment of the computer installation itself. As such, it is necessary to identify problems in general and leave the security determination up to the installation.

The underlying philosophy of the project recognizes the similarities in design among the various O/S. It follows that integrity flaws must have similarities which are applicable across the various systems.

The work procedes along three major lines:

1. A set of programs has been constructed which aid in the examination of O/S. The tools are semi-automatic requiring programmer interaction. The tools operate on a data base which is constructed and maintained for each O/S. The data base elements are:

   a. The output edit from the assembly of the O/S.

   b. The Parsed Data Structure (PDS) is a fixed assembly format in which all O/S edits are placed.

   c. The Total Source Listing (TSL) is idential to the assembly edit with the addition of the sequence numbers from the PDS.

   d. The Master Cross Reference (MCR) is an inverted file of all symbols in an O/S.

The tools themselves consist of:

a. The Source Program Alteration Module searches a module of PDS or TSL according to a Boolean list containing opcodes, operands, and labels. User comments may be inserted at each match point. 8a

b. A Statistical Analysis program operates on the modules in the Parsed Data Structure. 8b

c. A Cross Reference Interface and Search Program operates on MCR according to a Boolean string encompassing multiple instruction lines. 8c

d. The External Reference Program produces a listing of all external references. 8d

e. Compare - Capable of comparing two system releases identifying diffences, additions, deletions, etc. 8e

2. A modeling effort to produce a graph model of a given O/S in which nodes represent parts of that system - procedures or data structures - and edges show either synchronizing operations between shared components or changes in the use of capability controlled resources. Flaw suspects are to be uncovered at those places where resources are unexpectedly acquired or released, or where the synchronization of shared information is inadequate. 9

3. The development of a TENEX "exerciser" program consisting of a set of programs designed to drive the TENEX monitor throught all possible exits of conditional instructions and to note any fault situations that occur. 10

The tools have been applied to TENEX; GECOS-3; EXEC-8; IBM - VM, OS/MVT. The data base includes mulipie copies of some of these systems. It is currently around three times ten to the ninth bits. All programs and the data base are on the LLL Octopus system, but plans are under way to transfer the tools to our PDP-11 system for greater utility to ARPA and DOD. 11

A taxonomy of generic error classifications is being consructed. The taxonomy is based on our experiences with the various O/S and reflects an analysis of the RISOS file of reported and confirmed errors found in each manufacturer's product. 12

JAKE 23-FEB-75 23:36 25443

PI-Write-up, Abbott

(J25443) 23-FEB-75 23:36;;;; Title: Author(s): Elizabeth J. (Jake) Feinler/JAKE; Distribution: /ACM([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JAKE; Origin: < PI, ABBOTT.NLS;2, >, 23-FEB-75 15:46 JAKE ;;;; ####;

JAKE 23-FEB-75 23:37 25444

PI-Write-up, Abramson

ALOHA SYSTEM RESEARCH
1974 ARPA Project Summary

Prepared for: ARPA IPT Principal Investigators Conference
San Diego, Mar. 12-14, 1975

Prepared by: Norman Abramson
THE ALOHA System
University of Hawaii
Honolulu, Hawaii 96822

1. ALOHA REPEATERS - ALAN OKINAKA

THREE ALOHA REPEATERS HAVE BEEN SUCCESSFULY BUILT AND TESTED FOR USE IN THE ALOHANET. BY MEANS OF THE REPEATER THE REACH OF THE ALOHANET CAN BE EXTENDED BEYOND THE 50 TO 100 MILE RANGE OF A SINGLE RADIO TRANSMITTER, THE NETWORK CAN BE EXTENDED OVER OR AROUND OBSTACLES AND THE GEOGRAPHICAL COVERAGE OF THE SYSTEM CAN BE SHAPED TO CONFORM TO OTHER REQUIREMENTS. THE REPEATERS HAVE MADE POSSIBLE THE STUDY OF TRAFFIC WHICH ACCESSES THE MENEHUNE THRU SINGLE AND MULTIPLE REPEATER HOPS (SEE ITEM 3). SINCE THE REPEATERS BUILT SO FAR DO NOT INCLUDE PROGRAMMABLE UNITS, WORK ON PROVIDING THIS CAPABILITY IS CONTINUING. AS SOON AS PROGRAMMABLE CAPABILITY IS AVAILABLE, WE PLAN TO USE THE ALOHA REPEATERS IN SUPPORT OF OUR THEORETICAL WORK ON SPATIAL CHANNEL CAPACITY.

2. ALOHA CHANNEL PROTOCOL AND PCU'S - CHRISTOPHER HARRISON

DURING THE PAST YEAR THE FIRST ALOHA PROGRAMMABLE CONTROL UNITS (PCU'S) WERE COMPLETED AND PUT INTO SERVICE. THE PCU'S ARE BUILT AROUND AN INTEL 8080 MICROCOMPUTER CHIP AND PROVIDE IMPORTANT EXPERIMENTAL SUPPORT TO THE THEORETICAL STUDY OF PACKET BROADCASTING CHANNELS AND TO THE STUDY OF PROTOCOLS FOR SUCH CHANNELS (SEE ITEM 3). BY MEANS OF PCU'S WE ARE NOW ABLE TO INTEGRATE CHARACTER-BY-CHARACTER TRANSMISSION, VARIABLE LENGTH PACKETS AND FILE TRANSFERS WITHIN THE EXISTING ALOHA CHANNEL. AN UNEXPECTED BYPRODUCT OF THIS WORK IS THE DEMONSTRATION OF THE FLEXIBILITY OF PACKET BROADCASTING CHANNELS IN PERMITTING A WIDE VARIETY OF SYSTEM AND PROTOCOL CHANGES WITHIN AN ESTABLISHED SYSTEM WITHOUT REQUIRING ANY CHANGES IN THE OPERATION OF EXISTING USERS.

3. STATISTICS COLLECTION SYSTEM - RICHARD BINDER, MICHAEL FERGUSON

AN INITIAL STATISTICS COLLECTION SYSTEM WHICH MONITORS THE PERFORMANCE OF THE ALOHANET HAS BEEN PUT INTO OPERATION AND HAS PROVIDED THE FIRST SET OF STATISTICS AVAILABLE ON ALOHANET TRAFFIC.

PI-Write-up, Abramson

THE SYSTEM MEASURES ALOHANET DOWNTIME, USER PACKETS ON THE RANDOM ACCESS CHANNEL, PACKET LENGTHS, INTERPACKET TIMES, THE NUMBER OF PACKET REPETITIONS AND OTHER QUANTITIES. THE SYSTEM NOW MONITORS ONLY THE RANDOM ACCESS CHANNEL BUT WORK ON UPGRADING THE EXISTING SYSTEM TO ALLOW STATISTICS COLLECTION ON THE BROADCAST CHANNEL FROM THE MENEHUNE TO THE USERS IS IN PROGRESS. THE STATISTICS COLLECTION SYSTEM HAS ALREADY PROVIDED DATA FOR GUIDANCE IN THE USE OF THE ALOHA SIMULATION FACILITY (ITEM 4). 10

4. ALOHA SIMULATION FACILITY - RICHARD BINDER, MICHAEL FERGUSON 11

A SIMULATION FACILITY FOR THE ANALYSIS OF PACKET BROADCASTING CHANNELS HAS BEEN COMPLETED. THE FACILITY CAN ACCOMODATE A VARIETY OF CHANNEL PROTOCOLS AND OF USER CHARACTERISITICS TO ALLOW THE STUDY OF PACKET BROADCASTING SYSTEMS. THE OUTPUT OF THE STATISTICS COLLECTION SYSTEM (ITEM 3) HAS BEEN USED AS A GUIDE IN THE SELECTION OF USER
CHARACTERISTICS FOR THE SIMULATION FACILITY. THE OUTPUT OF THE SIMULATION FACILITY IN TURN HAS BEEN USED TO SUGGEST NEW THEORETICAL RESULTS WHICH WILL BE REPORTED IN EARLY 1975. 12

5. SATELLITE PACKET BROADCASTING - DAVID WAX 13

THE FIRST USE OF A SATELLITE TRANSPONDER IN A PACKET BROADCASTING MODE AMONG MORE THAN TWO USERS WAS SUCCESSFULY DEMONSTRATED IN 1974. THE TRANSPONDER USED WAS THE ATS-1 VHF TRANSPONDER AND THE EARTH STATIONS IN THIS EXPERIMENT WERE NASA/ARC, THE UNIVERSITY OF ALASKA AND THE ALOHA SYSTEM. THE EARTH STATIONS EMPLOYED WERE SMALL VHF STATIONS SUPPLIED BY NASA; NEW FAST ACQUISITION ALOHA MODEMS WERE LATER EMPLOYED TO IMPROVE ERROR RATES THRU THE ATS-1 TRANSPONDER. IN ADDITION, A NEW TECHNIQUE WHICH ALLOWS THE TRANSMISSION OF SHORT DATA PACKETS AT THE SAME TIME AS A CONVENTIONAL VOICE SIGNAL ON A SINGLE VOICE CHANNEL HAS BEEN TESTED ON THE ATS-1 SATELLITE. 14

6. THEORY OF ALOHA DYNAMICS - THOMAS GAARDER 15

A MATHEMATICAL MODEL OF AN ALOHA CHANNEL WITH BLOCKING AND CARRIER SENSE HAS BEEN CONSTRUCTED TO DESCRIBE THE DYNAMIC BEHAVIOR OF THE CHANNEL. IN THIS MODEL NEW PACKETS AND BLOCKED PACKETS ARE EACH SENT AT TIMES WHICH FORM A POISSON POINT PROCESS. FROM THE SOLUTIONS OBTAINED IT HAS BEEN FOUND THAT THE THRUPUT MAY APPROACH 1/E, BUT IN THE SATURATED CONDITION THE AVERAGE DELAY IS PROPORTIONAL TO THE NUMBER OF USERS AND THE USERS ARE BLOCKED MOST OF THE TIME. BY REDUCING THRUPUT BELOW THE CHANNEL CAPACITY, THE AVERAGE DELAY AND THE AVERAGE NUMBER OF BLOCKED USERS CAN BE REDUCED. 16

PI-Write-up, Abramson

7. VARIABLE LENGTH PACKETS - RICHARD BINDER, MICHAEL FERGUSON 17

THE BEHAVIOR OF AN ALOHA CHANNEL USING VARIABLE LENGTH PACKETS WITH A GEOMETRIC DISTRIBUTION OF PACKET LENGTHS HAS BEEN INVESTIGATED USING THE ALOHA SIMULATION FACILITY AND A MARKOV MODELLING TECHNIQUE. AVERAGE CHANNEL THRUPUT AND USER DELAY DISTRIBUTIONS WERE OBTAINED UNDER A VARIETY OF CONDITIONS. RESULTS SHOWING THE EFFECTS OF CHANNEL DATA RATE ON RANDOM ACCESS CHANNEL STABILITY WERE ALSO OBTAINED. 18

8. THEORY OF MULTIPLE USER CHANNELS - SHU LIN 19

WE HAVE OBTAINED NEW CODING RESULTS FOR TWO CHANNEL MODELS. THE FIRST CHANNEL MODEL IS REFERRED TO AS A NOISELESS MULTIPLE ACCESS BINARY ERASURE CHANNEL. IN THIS MODEL, IF THE TWO TRANSMITTED BITS FROM THE TWO USERS ARE BOTH ZEROS (ONES), A ZERO (ONE) IS TRANSMITTED OVER THE CHANNEL TO THE RECEIVER; IF THE TWO TRANSMITTED BITS ARE DIFFERENT, AN ERASED SYMBOL X IS TRANSMITTED TO THE RECEIVER. IN THE SECOND CHANNEL MODEL, NOISE IS INTRODUCED. FOR BOTH CHANNEL MODELS, THE INPUT TO THE DECODER IS A VECTOR WITH SYMBOLS FROM (0,1,X). THE DECODER PROCESSES THE RECEIVED VECTOR AND DECODES IT INTO TWO CODE WORDS,ONE FOR EACH OF THE DATA SINKS. 20

JAKE 23-FEB-75 23:37 25444

PI-Write-up, Abramson

(J25444) 23-FEB-75 23:37;;;; Title: Author(s): Elizabeth J. (Jake) Feinler/JAKE; Distribution: /ACM([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JAKE; Origin: < PI, ABRAMSON,NLS;3, >, 23-FEB-75 17:35 JAKE ;;;; ####;

JBP 24-FEB-75 09:15 25445

add to nswdoc 'tools,files'

Jim:
We ought to have millsteins "Tools,Files" in nswdoc. 1

JBP 24-FEB-75 09:15 25445

add to nswdoc 'tools,files'

(J25445) 24-FEB-75 09:15;;;; Title: Author(s): Jonathan B. Postel/JBP; Distribution: /JEW([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JBP;

JBP 24-FEB-75 09:32 25446

PCP questions from Doug Wells (Multics)

(J25446) 24-FEB-75 09:32;;;; Title: Author(s): Jonathan B. Postel/JBP; Distribution: /JEW([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: JBP;

JBP 24-FEB-75 09:32 25446

PCP questions from Doug Wells (Multics)

23-FEB-75 17:03:11,2048
Net mail from site MIT-ML rcvd at 23-FEB-75 17:03:00
Date: 23 FEB 1975 2004-EST
From: DMW at MIT-ML
To: postel at SRI-ARC, dmw at MIT-MULTICS

Jon,
received the source programs, thanks. Now I have some more questions:

1) in PCPFMT's description of PCPTXT, is the length of a list the number of top-level items in the list, i.e., is it equivalent to the LENGTH function in LISP;

2) in the same place, what does the 'schar' construct mean;

3) in a number of places error codes are mentioned, are any yet defined and documented;

4) for PMP, there are a number of always present data-stores with specified names, are these referenced as CHARSTR's when it is necessary to reference them?

5) in PIP CALPRO (for example), why are specific interfaces given rather then general formats which the local implementation can then fill in? In particular, the event to be signalled when something of interest happens to a parallel running process, is specified as a character string; however, the construct very much matchs Multics IPC event channels, which are not specifiable as character strings (except in the 'make printable' translation;

6) while we don't intend to implement this time around, I notice that LLDBUG allows an address to be specified as an integer, but a PDP-11 (or even an IBM-370) can't put a Multics address into one of its INTEGER's.

7) I seem to recall from the meeting at BBN that when a TBH needs a NSW file, it calls the WM (presumably MILLSTEIN's <open file> function), which then returns a local file name. Did the WM come back to the local host via the File-Package and ship the file over (as I seem also to recall)?;

8) when I went to fetch <MILLSTEIN>TOOLS.FILES, I first attempted to list the directory, and was told that there were no files. Is his directory locked in some way, did all his files go away, etc.?? And where is the file TOOLS.FILES??

Thanks, Doug Wells

CHI 24-FEB-75 09:51 25447

Paging in DNLS

(J25447) 24-FEB-75 09:51;;;; Title: Author(s): Charles H. Irby/CHI;
Distribution: /WEC([INFO-ONLY]) RWW([INFO-ONLY]) JMB([
INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: CHI;

CHI 24-FEB-75 09:51 25447

Paging in DNLS

Bill, some time ago we proposed that in DNLS <LineFeed> would advance one screenfull and " would go back a screenfull. However, other commitments prevented us from implementing this. As far as I am concerned, the need is still there to be filled as our resources and commitments allow. Please note that the computation necesssary to go backward one screenfull is immense so I recommended that " be equivilent to Jump Return and would thus only behave properly if the user had been doing <LineFeed>s first.
-- Charles.

1

DSM 24-FEB-75 11:08 25448

Quick notes on List implementation

(J25448) 24-FEB-75 11:08;;;; Title: Author(s): David S. Maynard/DSM;
Distribution: /JEW([ACTION]) CHI([ACTION]) ; Sub-Collections:
SRI-ARC; Clerk: DSM;

DSM 24-FEB-75 11:08 25448

Quick notes on List implementation

This represents some quick rough notes on my thoughts , somewhat rambling on list implementation. I alo generated a quick example utilizing lists. Perhaps this could serve as a basis for further discussion. I must admit I do not fully understand the semantics of the example I wrote.

DSM 24-FEB-75 11:08 25448

Quick notes on List implementation

(thoughts) 1

Internal structure : 1a

litflg: Boolean true implies value is in RH, 1a1

false implies RH holds address of a data structure 1a1a

lclflg: Boolean, True implies declared locally to a procedure or coroutine, 1a2

false implies allocated from a storage allocator 1a2a

%This is not needed all "data structures" are allocated, If the data strucure is declared locally its address is treated as a literal? % List[i] _ $localydeclarelist How does this differ from List[i] _ @$localydeclaredlist@ 1a2b

I assume that the first example above is correct, but how does the compiler know that $blap only takes 18 bits? answer because of the syntax, i.e, the missing @'s . The second example seems to be legal syntax but seems to have catastophic semantics, one would hope that this is never done, One second thought this probaly woulndn't hurt anything because the allocator should be smart enough to know he didn't allocate this strange looking address and therefore won't attempt to free it, 1a2c

ownflg: Boolean, True imlies that the data structure "belongs to this element of this list, False implies this is a "bootleg copy" of the data structure, 1a3

RH 18 bits contains either value or address of a data structure 1b

Typeing issues are data structures typed? 1c

Possible types 1c1

L10 string 1c1a

L10 Lists 1c1b

L10 Record ? and Record definition? for example this data structure is a da, display area record, 1c1c

Question DO the allowable entities on the right of an assignment statement depend on the type of element on the left of the assignment operator? i,e, is localvariable _ @(@listB@ [j])@ valid syntacticaly ? if so what are the semantics, I realise that is always

possible for programmers to write bad code however i think that we should push as much as possible into the compiler to save debugging time. 2

Question 3

if list[i] contains a data strucure which do I use on the right-hand side? 3a

#destlist#[i] _ #list# [i] 3a1

or 3b

#destlist# [i] _ @#list#@ [i] 3b1

are these semantically the same? if not what happens when I say #list# [i,j] which are treated as @ @ ? all or none ? what happens if some are data structures and some are literals? 3c

EXAMPLE 4

The following pocedure is designed to be somewhat realistic example of using lists and storag allocators in L10, This procedure given an stid generates a list of lists of character strings corresponding to the structure and text of the plex specified by the stid. The plex is represented as : 4a

LIST (elem, elem, ...) 4a1

where elem is LIST(Charstr,empty) or LIST(CHARSTR, SUBLIST) where SUBLIST is a list of the substructure of the statement. 4a2

(encodeplex) PROCEDURE (stid); 4b

% encodes the structure and text of the plex at stid a follows 4b1

LIST(elem, ...) 4b1a

Where elem is either LIST(CHARSTR, EMPTY) or 4b1b

LIST(CHARSTR, SUBLIST) 4b1c

Where SUBLIST is an identical encodeing of the substructure of the statement. 4b1d

RETURNS the address of the LIST % 4b2

LOCAL substid, i, initm, stlist, plist, straddr; 4b3

Quick notes on List implementation

```
LOCAL TEXT POINTER tp1, tp2;                                    4b4
REF stid, substid, stlist, plist, straddr;                      4b5
initm _ 10; %initial size for this list%                        4b6
i _ 1;                                                          4b7
%allocate an initial list for the plex%                         4b8
&plist _ allocatelist(initm);                                   4b9
%Loop over all statements in plex%                              4b10
DO                                                              4b11
   BEGIN                                                        4b11a
   %allocate list for this statement%                           4b11b
   &stlist _ allocatelist(2);                                   4b11c
   FIND SF(stid) "tp1, SE(stid) "tp2;                           4b11d
   &straddr _ allocatestring(tp2[1] - tp1[1]);                  4b11e
   *straddr* _ tp1 tp2;                                         4b11f
   #stlist#[1] _ @&straddr@;                                    4b11g
   IF (substid _ getsub(stid) # stid THEN                       4b11h
      #stlist#[2] _ @encodeplex(substid)@                       4b11h1
   ELSE #sblist#[2] _ 0; %empty flag, no substructure%;         4b11i
   IF i > plist.M THEN                                          4b11j
      BEGIN                                                     4b11j1
      % reallocate list - get a bigger list and copy%           4b11j2
      &biglist _ allocatelist(2*plist.M);                       4b11j3
      #biglist#[1,plist.M] _ #plist#[1,plist.M];                4b11j4
      &plist _ &biglist;                                        4b11j5
      END;                                                      4b11j6
```

```
      #plist#[i] _ @&stlist@;                                          4b11k
      i _ i+1;                                                         4b111
      END UNTIL (stid := getsuc(stid) ) = stid;                        4b11m
   RETURN(&plist);                                                     4b12
   END.                                                                4b13
(printplex) PROCEDURE  (plist);                                        4c
   LOCAL STRING cstring[2000];                                         4c1
   LOCAL sublist, loclist, i;                                          4c2
   LIST plist;                                                         4c3
   REF plist, sublist;                                                 4c4
   FOR i _ 1 UP 1 UNTIL i > plist.M DO                                 4c5
      BEGIN                                                            4c5a
      &loclist  _ #plist#[i];                                          4c5b
      *cstring* _ * #loclist#[1] *;                                    4c5c
      printformatted($cstring);                                        4c5d
      IF (&sublist _ #loclist#[2]) # 0 THEN printplex(&sublist);       4c5e
      END;                                                             4c5f
   RETURN;                                                             4c6
   END;                                                                4c7
```

RLL 24-FEB-75 12:22 25449

Insert date command

(J25449) 24-FEB-75 12:22;;;; Title: Author(s): Robert N. Lieberman/RLL; Distribution: /FEED([ACTION]) JHB([INFO-ONLY]) ; Sub-Collections: SRI-ARC; Clerk: RLL;

RLL 24-FEB-75 12:22 25449

Insert date command

It seems that th insert date comman has DATE as a second level command word, However there is no first level command word, Isthere a missing command word? (either because I do not have permission to use it or because it is not implemented yet), Or is this a mistake? If it is to be consistnet witht he insert time and date comman in which the TIME command word is in fact a second level one, I am lost as to its advantage.

1

RLL 24-FEB-75 14:44 25450

Contact report with Tymshare on Tymnet, 7 Feb 75

I have some cost figures for TYMNET and comparable ones for TELENET,

RLL 24-FEB-75 14:44 25450

Contact report with Tymshare on Tymnet, 7 Feb 75

(DATE) 7 FEB 75 1

(BY) Lieberman 2

(ATTENDEES) 3

Paul Brickey of Tymshare 3a

Ed Pollack (EEP) of Tymshare 3b

Bob Martinez (BOBM) of Tymshare 3c

Jerry Wheat of Tymshare 3d

Art Case of Tymshare 3e

Jim Bair (JHB) of SRI-ARC 3f

Ray Panko (RA3Y) of SRI-ARC 3g

Robert Lieberman (RLL) of SRI-ARC 3h

(ADDRESSES) Full name of organization, address, and phone number 4

(MEDIUM) FACE-TO-FACE 5

(WHERE) Tymshare, Cupertino, CA 6

(ACTION-ITEMS) 7

None 7a

(DISTRIBUTION) DCE JCN RLL RA3Y JHB ARC-LOG 8

(REFERENCES) 9

(REMARKS) 10

The attendees from SRI-ARC went to Tymshare to find out about the current and future status of their communication network. 10a

Ed Pollack (our current contact point for the utility) set up the meeting. Paul Brickey was the salesperson who was to give the presentation. 10b

Paul was a stereotype salesperson and proceeded to give the usual sales talk. 10b1

We listened for awhile and then steered away from that level and ask more technical questions. 10b2

Paul was obviously not the man to pin down on this. Ed Pollack seemed to speak from some knowledge and Bob Martinez contributed. 10b3

Finally Paul went out and brought back Art Case who clearly was a member of the technical staff. He answered many of our questions and appeared knowledgeable. 10b4

These are my notes from the entire 2 hour talk. 10c

Hardware and software 10d

The BASE is the software in a host that connects to the net. 10d1

Tymnet has about 130 Varian 620L's called Tymsats and Tymcoms with access in 73 cities. 10d2

The Tymsats are the minicomputers that user terminals dail into and the Tymcoms are the minicomputers that hook up to the host computers. 10d2a

Their current Tymsats have 8K memory with 4k devoted to buffers. 10d2b

The Tymcom minicomputer is hooked into the host computer (the DC-10 line scanner for the PDP-10) and looks like a 103A or 113A to the computer. 10d2c

Thus the Tymnet service appears just like any other dialup line coming in. 10d2c1

The packets for the Tymnet are 64 bytes. They are internal and may mix several customers. 10d3

The baud between host and node is 4800 at the moment. 10d4

There is no option for the present Tymnet for echoing of characters. It is fixed with the specification of terminal type. 10d5

At present when the system is outputting, the echoing goes to deferred. This is the only switching of echoing for the current Tymnet. 10d5a

Parity can be supplied on output to the user terminals. 10d6

Contact report with Tymshare on Tymnet, 7 Feb 75

Tymcoms cannot talk to a Tymcom; hence computer to computer connections are not possible. 10d7

Stanford Universty has a PDP-10 KI10 on both Tymnet and ARPANET (The latter connection should happen soon.). 10d8

The SU connection is called SUMEX. Their hookup is different than most. 10d8a

It goes directly to the Tymnet via the memory bus. This needs special code on the PDP-10. 10d8b

The software will be in the public domain so that it most likely will be readily available. 10d8b1

The reason for directly going into the memory bus is for speed. 10d8c

There is apparently a multiplexor for the ports going into the memory bus. 10d8d

Currently only two hosts per node are allowed. 10d9

Right now the baud rate is 1200. It will go up to 9600 baud for the terminal speed. 10d10

Tymnet II 10e

Tymshare is now beginning to upgrade their minicomputers for the pending TYmnet II. 10e1

Both Varian 73 computers and Interdata equipment are on order. 10e2

The Varian 73's will allow 4 hosts to be attached and have 90 dialup and sixteen 9.6Kb ports. 10e3

In Tymnet II one can have either deferred or immediate echoing. This can be adjusted by the computer host and the user via the host. 10e4

The new Tymnet will allow 2780 RJE type terminals in 6 months (2000 baud) and 3270 type as well. 10e5

It is conceivable to program modules into the new supernode (Interdata mini) to handle cases like minicomputers (for example he front end). 10e6

The new Tymnet will have plenty of buffer space and that they

do not believe they will have any problems there, (my comment: overly optimistic). 10e7

The supervisor will continue to do most of the monitoring. 10e8

Tymnet II will have 50Kb lines from the present 9600 baud lines. Not all will be the 50kb variety though. 10e9

In many cases they will have several 9,6 lines rather than one large line between two nodes. 10e10

Tymnet II will have dynamic rerouting in 6 months according to the salesperson but the technical person suggested more like 12 to 18 months. 10e11

General 10f

They have two lease cables to London and Paris. 10f1

They also have a satelite backup and the special software to handle it. 10f2

They have plans to go to Hawaii but not in the very near future. 10f3

There is a 60 day wait for a full hookup and only a 90 day commitment. 10f4

They have run cassettes via the net with no buffer problems. 10f5

Big push this year is to increase terminal speed capability. 10f6

They gross $2 million per year for the Tymnet operation. 10f7

Scenario of a terminal session. 10g

dial up 10g1

type a character identifying the baud rate and padding characteristics 10g2

type your name, password 10g3

the network will let you know if a circuit has been made, usually within 5 seconds. 10g4

From now until you hang up the phone line, you are unaware of the network. There is no way to hail the network directly.

Contact report with Tymshare on Tymnet, 7 Feb 75

You must go through the host (assuming the host has the appropriate software to communicate to the network). 10g5

Reliabilty: 10h

one hardware problem per year on the current Tymsats. 10h1

Maintenance 10i

Tymshare handles all maintenance except phone lines but assumes the responsibility to get the phone line repaired. They have nearly a $2 millIion phone bill a year. 10i1

Some modems are maintained by Tymshare. 10i2

Costs for Tymnet I (only) 10j

The pricing of a 4800 baud connection will be available about 15 May 75. 10j1

The pricing for Tymnet II is unknown at the moment. 10j2

A. Each logon to host computer	$.50/each	10j3
B. accumulative per month time connected to host for all terminals		10j4
0 to 500 hours	3.00/hour	10j4a
next 1500 hours	2.50	10j4b
next 3000 hours	2.00	10j4c
next 5000 hours	1.50	10j4d
each hour over 10,000	1.00	10j4e
C. Transmission of characters char	0.125/1000	10j5
between users (both ways) and host computer		10j5a
D. TYMCOM-III rental (30 ports)	2150./month	10j6
To buy = $40k		10j6a
(includes line between TYMCOM and net, maintenance, accounting, etc.)		10j6b

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E. One time engineering installation charge, 1000. 10j7

(DOCUMENTS) Hard copy given and received 11

(GIVEN) Date and documents given 11a

(RECEIVED) Date and documents received 11b

Information sheet, "The Tymshare Network", Tymshare, 1971 11b1

Information sheet, "Tymnet Users", Tymshare, no date 11b2

Information sheet, "Network Services Node Access Locations", Tymshare, May 1975 11b3

A map of the AT&T long lines for the Tymnet, January 1975 11b4

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(J25450) 24-FEB-75 14:44;;;; Title: Author(s): Robert N. Lieberman/RLL; Distribution: /DCE([ACTION]) JCN([ACTION]) RLL([ACTION]) RA3Y([ACTION]) JHB([ACTION]) ARC-LOG([ACTION]) ; Sub-Collections: ARC-LOG SRI-ARC; Clerk: RLL;