EKV 7-JUL-71 11:42 7380

Experimental Schedule to Improve System Response

We are now going to try this schedule for a while to try to improve system response. 1

1. Compilation and loads and assemblies -- 12 noon - 1PM (no other users)
8 PM - 8 AM 2

2. Output Processor .....0-5 pages anytime
more than 5 pages 8 - 9 AM
4 PM - 5 PM 3

3. Collector Sorter . . . . . nites & weekends 4

4. Journal (hard copy) . . . . . 5 AM - 8 AM 5

5. Quick Print . . . . . anytime 6

6. Printer . . . . . anytime 7

7. Experimental NLS Systems . . . . . anytime 8

EKV 7-JUL-71 11:42 7380

Experimental Schedule to Improve System Response

(J7380) 7-JUL-71 11:42; (Expedite) Title: Author(s): Ed K. Van De Riet/EKV; Distribution: Marilyn F. Auerbach, Don I. Andrews, Martin E. Hardy, Barbara E. Row, Fred P. Hocker, Jake Ratliff, Cindy Page, Beauregard A. Hardeman, Jeanne B. North, Walter L. Bass, Charles H. Irby, Mimi S. Church, Bruce L. Parsley, J. D. Hopper, John T. Melvin, Kenneth E. Victor, Richard W. Watson, Douglas C. Engelbart, Mil Jernigan, James C. Norton, Roger D. Bates, William H. Paxton, Don C. Wallace, William S. Duvall/MFA DIA MEH BER FPH JXR CXP BAH JBN WLB CHI MSC BLP JDH JTM KEV RWW DCE MEJ JCN RDB WHP DCW WSD; Keywords: ; Sub-Collections: ARC; Clerk: BER;
Origin: <ROW>SCHEDULE.NLS;2, 7-JUL-71 8:30 BER ;

RWW 7-JUL-71 15:15 7381

A Suggested Policy on Distribution of NIC Manuals

Policy on Maintaining NIC Manuals at Network Sites 1

Our general policy of maintaining functional documents is that we will provide updates for the Station Agent's copy and, in some cases, for the Liaison's copy. We need a more liberal policy for NIC manuals, such as the TNLS Guide. A suggested policy would be the following: 2

(1) As a site comes on the network, send the Station Agent five copies, one for the station collection and four for loan or to be placed in the terminal area. 2a

(2) Send the Liaisons one copy. 2b

(3) We will send the Station Agent additional copies if she requests them, but the number of copies at the site is not to exceed the number of users entered in our system. 2c

(4) When updates are made to the manual, we will send one to the Liaison and as many others as there are copies at the site to the Station agent. She is then responsible to update her collection copy and post an announcement of a new update or make them in her other copies. 2d

(5) Cindy or someone maintains a file which indicates the number of copies to be updated at each site. 2e

RWW 7-JUL-71 15:15 7381

A Suggested Policy on Distribution of NIC Manuals

(J7381) 7-JUL-71 15:15; (Expedite) Title: Author(s): Richard W. Watson/RWW; Distribution: Cindy Page, Jeanne B. North, James C. Norton, John T. Melvin, Marilyn F. Auerbach, Dirk H. van Nouhuys/CXP JBN JCN JTM MFA DVN; Sub-Collections: ARC; Clerk: RWW;
Origin: <WATSON>MANUAL.NLS;2, 7-JUL-71 15:12 RWW ;

WSD 7-JUL-71 22:19 7383

NLS Note

I got the editing done, but did not have time to load or compile (system probs again). Files needing to be compiled areunder TASKS. 1

NLS Note

(J7383) 7-JUL-71 22:19; (Expedite) Title: Author(s): William S. Duvall/WSD; Distribution: Charles H. Irby, Mimi S. Church, William H. Paxton, Harvey G. Lehtman/CHI MSC WHP HGL; Sub-Collections: ARC; Clerk: WSD;

MFA DVN 8-JUL-71 13:43 7384

More Mnemonic Names for Load and Output file

(J7384) 8-JUL-71 13:43; (Expedite) Title: Author(s): Marilyn F. Auerbach, Dirk H. van Nouhuys/MFA DVN; Distribution: Mimi S. Church, William S. Duvall, Charles H. Irby, James C. Norton, Richard W. Watson, William H. Paxton, Dirk H. van Nouhuys/MSC WSD CHI JCN RWW WHP DVN; Keywords: files commands output load write open mnemonic; Sub-Collections: ARC; Clerk: DVN; Origin: <VANNOUHUYS>JOURDRAFT.NLS;10, 8-JUL-71 13:27 DVN ;

More Mnemonic Names for Load and Output file

n

More Mnemonic Names for Load and Output file

The present command names "load file" and "output file" are very confusing to people learning NLS because, with the evolution of the system, the connection to "loading" or "putting out" in any general sense has become very tenous. When we load a file we often speak of the operation as involving opening, and when we output a file we creat a new file. 1

We propose the following new names for implementation before the next NLS course for outsiders: 2

For "load file" we propose "open file." 2a

For "output file" we propose "write file." 2b

JCN DCW 9-JUL-71 10:20 7385

Rubout key question: where and when to relocate

JCN DCW 9-JUL-71 10:20 7385

Rubout key question: where and when to relocate

Every now and then the question of "rubout key is in the wrong place and should be moved comes up" ..it just did again. When will we try moving to another location? ..like up where tab key is on display consloe keyboard.. 1

JCN DCW 9-JUL-71 10:20 7385

Rubout key question: where and when to relocate

(J7385) 9-JUL-71 10:20; Title: Author(s): James C. Norton, Don C. Wallace/JCN DCW; Distribution: Ed K. Van De Riet, Richard W. Watson, Charles H. Irby, James C. Norton/EKV (The question is for you to answer, I guess) RWW (ekv to answer .. your comments?) CHI JCN; Keywords: ; Sub-Collections: ARC; Clerk: JCN;

*****

There is a new Output Processor directive which will cause the Output Processor to run about an order of magnitude faster. This directive is designed to be used with preformtted documents such as the NIC catalog indices but can be used for other documents at the user's peril. If you are interested in using this new directive, please see me for info.

*****

1

(J7386) 9-JUL-71 11:48; Title: Author(s): Walter L. Bass/WLB; Distribution: Marilyn F. Auerbach, William S. Duvall, Douglas C. Engelbart, Charles H. Irby, Mil Jernigan, Harvey G. Lehtman, Jeanne B. North, James C. Norton, Bruce L. Parsley, Dirk H. van Nouhuys, Richard W. Watson, James A. Fadiman/MFA WSD DCE CHI MEJ HGL JBN JCN BLP DVN RWW JAF; Keywords: ; Sub-Collections: ARC; Clerk: WLB;

DVN 9-JUL-71 13:46 7387

Viewspecs, a Brief Table

n

Viewspecs, a Brief Table

VIEWSPECS
A Brief Table of Fingering, Function, and Characters

Mouse X X 0 Keyset	Char-acter	Function
0 0 0 0 X	a	show one level less
0 0 0 X 0	b	show one level deeper
0 0 0 X X	c	show all levels
0 0 X 0 0	d	show top level only
0 0 X 0 X	e	current statement level
0 0 X X 0	f	recreat display
0 0 X X X	g	branch show only
0 X 0 0 0	h	g off
0 X 0 0 X	i	show content passed
0 X 0 X 0	j	i or k off
0 X 0 X X	k	show content failed
0 X X 0 0	l	show plex only
0 X X 0 X	m	show statemnt numbers
0 X X X 0	n	hide statemnt numbers
0 X X X X	o	frozen statement windows
X 0 0 0 0	p	o off
X 0 0 0 X	q	show one line more
X 0 0 X 0	r	show one line less
X 0 0 X X	s	show all lines
X 0 X 0 0	t	first lines only

X 0 X 0 X	u	inhibit refresh display	24
X 0 X X 0	v	normal refresh display	25
X 0 X X X	w	all lines, all levels	26
X X 0 0 0	x	one line, one level	27
X X 0 0 X	y	blank lines on	28
X X 0 X 0	z	blank lines off	29
Mouse 0 X 0 Keyset			30
0 0 0 0 X	A	indent	31
0 0 0 X 0	B	don't indent	32
0 0 0 X X	C	show statement names	33
0 0 X 0 0	D	hide statement names	34
			35
0 0 X X X	G	statement numbers right	36
0 X 0 0 0	H	statement numbers left	37
			38
0 X 0 X X	K	show statement signatures	39
0 X X 0 0	L	hide statement signatures	40
0 X X 0 X	M	show markers	41
0 X X X 0	N	hide markers	42

DVN 9-JUL-71 13:46 7387

Viewspecs, a Brief Table

(J7387) 9-JUL-71 13:46; Title: Author(s): Dirk H. van Nouhuys/DVN; Distribution: Harvey G. Lehtman, Jeanne B. North, Charles H. Irby, Richard W. Watson, James C. Norton/HGL JBN CHI RWW JCN; Keywords: viewspecs; Sub-Collections: ARC; Clerk: DVN;
Origin: <VANNOUHUYS>VIEW.NLS;2, 9-JUL-71 13:33 DVN ;

DVN 8-FEB-74 13:28 7388

Othere Sources of Money, Some Thoughts and Leads

Many of us feel that the chances of NLS being "of benifit to mankind" would be very much better if its benifits and technology were not passing almost exclusively to The Department of Defense. 1

Besides we would sleep better. 1a

Considering the personal relationships and easey paths that have built up to DoD over the years and their ready access to money, it behoves us to try a little harder to when we seek non-DoD paticipants in the growth we imagine for NLS. 1b

Elizabeth has recently brought to our attention possible colaboration with the USGS. I get the impression that the people she has been talking with are intelligent, well heeled, and want to sponsor research in the main line of our interests. For myself I hope we give the opportunity careful and well intentioned examination. 1c

Dave Croker is trying to use computers to guide people through the bureaucracy of welfare services (e.g. journal, 18409). He has no certain money, but more active spport on our part might help him. 1d

It happens that NLS would be clearly useful for certain types of scholarly work in the humanities. I know enough about the field to easilly supply a list of foundations and universities to which a letter such as the draft below might reasonalby be addressed, if the EMC or whoever were will to commit someones time to follow it upmodestly but seriously. 1e

DRAFT Tickler for Orgaizations that Suppot Scholarly work in the Humanities: 2

NLS (Online System) is a complex body of computer-based tools developed over the last ten years at the Augmentation Research Center of SRI with the ultimate goal of assisting much of the intellectual work now associated with paper. In the past only people involed in computer development have had a chance to use NLS, but it has reached a point in its evolutin where other groups are beginning trial use. 2a

It is easy to imagine many scholarly jobs that NLS would quckly lighten. 2b

Let me say a very few words about what NLS does. In the way of editing a user may prick with a hand-held pointer a character, word, paragraph or other unit of text on a screen and revise, replace,, move, or copy it. NLS files are organized hierarchically as appears in attachment N. The user can manipulate

segments of hierarchy, e.g. a paragraph and its subparagraphs or, the chapters of a book, as she can words or pieces of text. 2c

such 2d

It is possilbe to print NLS files with many of the typsetting posibilities of offset, e.g. frequent changes of font and size, headers, glosses. 2e

NLS includes some automatic library services. For example this letter was delivered to a journal system which quized me for author, title, etc, and automatically created a library entry and listed it in author, title word and, on demand, other indices. NLS also distributed it to addresses known to the sytem. Finnally, when others cite this document, they may generate references such as those below automatically. 2f

Many programs exist that perform some of the services described above. NLS is special because it is integrated an interactive. The user operates it live at a keyboard, with one set of files and one set of commands. 2g

It is possible to add new commands to NLS with a little special training and to add more complex features by programming in an ALGOL-like laguage oriented towards text handling. 2h

NLS has recently become availabe as a utitlity to which users may subscribe. (g,journal,21645,) 2i

The utility has some restrictions. One is geography. The computers that support NLS are attached to the ARPA computer network. A user at one of the many academic institutions connected to the network (see attachemnt Y) might be able to arrange easy access to NLS. Any one further than a local call way from such an insitution would have to use long distance telephone lines. 2j

Another restriction is expense. A share of the utility sevice cost $40.000 a year. Each share entitles a user to 16 hours a day use on one terminal, X pages of online storage, essentially unimmited offline storage, training, and documentation. More money that the average organization supporting work in the humanities can spend lightly. 2k

Never the less it seems clear that scholarhsp will ultimately make substantial and systematic use of such aids. The time to begin developmental applicattions appears to me to be here. 2l

Attachment X shows that the Augmentation Reserach Center seeks to foster communites in many fields making use of NLS. The present

utitlity subscrition is full, but opening will exist in the future. We would be eager to cooperate with an institution such as X in promoting particiaption in NLS by scholars. 2m

ATTACMENTS: 2n

A New ARPANET Subscription Service:
The Workshop Utility at OFFICE-1<GJOURNAL,21645,> 2n1

The Augmented Knowledge Workshop <journal,14724,> 2n2

Online Team Environment <journal,13041,> 2n3

Coordinated Information Servicees for a Discipline- or Mission-Oriented Community <journal,12445,> 2n4

REFERENCES

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ij 3

is 4

DVN 8-FEB-74 13:28 7388

Othere Sources of Money, Some Thoughts and Leads

(J7388) 8-FEB-74 13:28; Title: Author(s): Dirk H. Van Nouhuys/DVN;
Distribution: /EMC PERC CHI EKM HGL DCW NJN JMB KIRK JML SRL;
Sub-Collections: SRI-ARC EMC PERC; Clerk: DVN;
Origin: <VANNOUHUYS>SCHOL.NLS;1, 6-FEB-74 21:10 DVN ;

Dirk H. van Nouhuys
Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

To:
Access Copy

7389

VIEWSPECS 1

Character	Function	
a	show one level less	3
b	show one level more	4
c	show all levels	5
d	show first level only	6
e	referenced stmnt level	7
f	recreate display	8
g	show branch only	9
h	show all branches	10
i	show content passed	11
j	show all content	12
k	discard until first pass	13
l	show plex only	14
m	statement numbers on	15
n	statement numbers off	16
o	frozen statements on	17
p	frozen statements off	18
q	show one line less	19
r	show one line more	20
s	show all lines	21
t	show first lines only	22
u	no defer display	23
v	defer recreate display	24

w	show all lines, all levels	25
x	one line, one level	26
y	blank lines on	27
z	blank lines off	28
A	indent	29
B	don't indent	30
C	show statement names	31
D	don't show statement names	32
		33
G	statement numbers right	34
H	statement numbers left	35
		36
K	show statement signatures	37
L	don't show statement signatures	38
M	show markers	39
N	don't show markers ARC 8/17/71	40

DVN 13-OCT-71 15:57 7389

Viewspecs

(J7389) 13-OCT-71 15:57; Title: Author(s): Dirk H. van Nouhuys/DVN; Distribution: Harvey G. Lehtman/hgl; Sub-Collections: SRI-ARC; Clerk: DVN;
Origin: <VANNOUHUYS>NARROWVIEW.NLS;1, 11-OCT-71 9:23 DVN ;

Project Management Seminar

GENERAL DESCRIPTION 1

On November 20 I spent the whole day at a "Project Management Seminar" staged by SRI in room S109 in the International Building. The seminar had been billed as education for inexperienced project leaders. About 20 people were seated around small tables arranged in an oval which occupied about half of large room. They included experienced as well as inexperienced project leaders. A number of people who came in to speak at one point or another sat at the back of the room some part of the day. A microphone at each table fed into a large tape recorder with its attendant at the back of the room. 1a

The moderator was Stew Blake. The format varied between lectures by Blake and others to dialogue among the people at the tables and the speakers. Blake encouraged questions very actively but when he held the floor the format remained that of a lecturer and an audience. At other times the distinction between the "learners" and the "experts" tended to disappear. 1b

According to the outline, the seminar was to cover the role of project leader, the SRI accounting system as a project leader sees it, organizing projects, monitoring the success of a project, and relations with clients. The actual discussions wandered gracefully over all those subjects plus, briefly, managing creativity. 1c

Let me just describe some discussions that stuck in my mind. One arose when one of the "experts" recounted how he had telephoned a client's technical monitor to ask how one of his staff people on the project was doing. The technical monitor said he was doing badly and that man was removed from the project. 1d

The discussion centered on two questions: 1d1

Was it appropriate to ask a client such a question and, 1d1a

What to do when a person is working badly and has to go off the project. 1d1b

No clear answer emerged to either question. Some people felt it was fine to approach a client in that way under some circumstances, others felt it should never be done. 1d1c

Several people declared that when someone was working badly on a project, the project leader should first explore with him ways to improve his work, 1d1d

but I felt that such declarations were lip service and

that people's real interest was in the problem of dismissing someone, perhaps because it is unpleasant. 1d1d1

Various participants suggested or opposed telling the departing project member the exact reason for his dismissal. 1d1e

There was considerable discussion of work statements. An expert urged that work statements be writtten as non-committal as possible. Other experienced hands said that the government was no longer accepting non-committal work statements. Others suggested that work statements should spell out choice points and areas of uncertainty as an alternative to ambiguity. In effect they should include alternative paths. 1e

There was lengthy and informative explanaton of the contents of PSR's (Project Status Reports, the financial output to managers from the SRI accounting system) and in particular of overhead and burden, how the different kinds of money counted with respect to one another, and what they went for. I got the impression that most people found the information about accounting the most practically useful part of the seminar. 1f

I discovered that under certain circumstances SRI will pay for its employees' flying first class. The government will not pay back SRI for the difference between first-class and coach fares as overhead. SRI spent something more than $200,000 on its employees riding first class last year. $200,000 could buy a dental plan and I am sure it could raise the SRI medical package above the mediocrity it now enjoys. Indulgence in this needless luxury at the cost of practical benefits appalled and disgusted me. 1f1

CRITICISMS AND SUGGESTIONS

The program is new. Stew Blake asked for suggestions for future programs and these are my thoughts in response to him. 2

The group should be smaller and the atmosphere should be more seminar-like. 2a

The best parts, for my needs anyway, were the description of financial matters and the dialogue among people. 2b

On a couple of occasions specialists in one thing or another delivered a lecture which was a nearly total loss because it was hard to follow or spun out points that could have been made in a minute. The same people, however, answered questions very usefully. 2c

A seminar room with fewer bystanders would help. (It was not my

problem, but I felt that some people had the boss looking over their shoulder). 2d

Some of the history of SRI could be omitted to be replaced by more information about accounting practices. 2e

No one should ever read papers that the audience has in front of them. 2f

I think there should be more attention to the differences in the size of projects. Stated in exaggerated terms, leading a $25,000 project is an intellectual problem while the million dollar project is a management problem. 2g

Stew Blake askeed if there should be similar seminars on Proposals; I would be interested. 2h

SOME THOUGHTS ABOUT THE CULTURE 3

Armed with a gin and tonic I walked back from this meeting to check in briefly at the group where I work which is a small, long standing organization rather isolated psychologically from the rest of SRI. For the most part I see its values as having to do with getting the work done well as distinct from (opposed to?) making money or "success" as defined below. Someone asked me what I had been doing all day. I was for a moment speechless. I found that it would be as difficult to explain this meeting as if I had been a witness to some partially secret rite. What words could I use to put it across? My momentary loss for a bridge between the seminar and my colleagues at SRI set me to thinking about the cultural gap. 3a

Appearance and Reality 3b

At the seminar there was a lot of tension expressed about what I called the disparity between "appearance and reality". But "appearance and reality" is not a complete name for the issue involves also prestige and the notion of pure science. Indeed part of the tensions arise from confusion among those ideas. A lot of anger was implied, but it was not clear whether the anger was aimed at the norms, the practice, or the disparity. 3b1

Let me tell you some things people said. 3b2

"I speak as a sinner who has repented". 3b2a

X: "Y and I were once honest researchers..."
Y: "Actually I wasn't honest, I was an administrator". 3b2b

There was also some admirably frank discussion of small areas in which SRI doesn't strictly follow government rules. 3b3

I don't know quite what to say about this tension except that people kept returning to it. There was a lot of feeling just below the surface. 3b4

I do believe pursuit of scientific ends 3b4a

is not really very important at SRI and, 3b4a1

has nothing directly to do with personal honesty. 3b4a2

Gallejo, after all, lied and cheated quite a good deal in order to 3b4b

carry out his scientific research, 3b4b1

aggrandize himself, and 3b4b2

suppress his results. 3b4b3

Shame and Success 3c

Years ago I wrote a review of the slick management magazine "Innovation". The review was intended for the Whole Earth Catalogue but not published. In it I discussed in particular an article eulogizing the management of Texas Instruments. It mentioned a large number of managers by name implying their great success and using a part of a sentence to identify each in some way. I pointed out that their treatment resembled the treatment in the Iliad of the numerous secondary heroes who are killed by the big guys (Achilles, Odysseus, etc). There is a kind of bright naming of these people that, like pearls on a string, is illustrious without conferring any real identity. 3c1

I should say also that the culture of the Iliad is what the anthropologists call a shame culture as opposed to the way we think of WASPS as having a guilt culture, that is, in Homer, sanctions are external; what is right is, roughly, what people think. 3c2

That review came to my mind yesterday when somebody said "the client and the technical monitor are just as success oriented as you are - they don't want to end up with egg on their face". I wrote down the remark because I was nervous at being bunched up with a group as being "success oriented", but I began to think more and more about the relation between success and shame. 3c3

The more I think about what "success" means in this context, the less certain I am what it is. It is clearly not simply the satisfaction of doing something well by your own lights, either solving a problem or managing a project. If it were no one else need ever know about it. It does not seem to come fro the unique ness of the task or the doer. Nor is it simply money. 3c4

There is a lot of talk and writing about people like the people gathered in S109 in terms of success and aggressiveness (somebody said "a good project leader is a bastard") or the territorial imperative, or guilt about aggression, etc. but there is not much talk about shame. Yet for the speaker success constituted more than anything else not being shamed. 3c5

It struck me that like heroes who go down in the Iliad, the group he was addressing included only people who were to a certain extent a success already. The more people are anxiously striving for success in competition among a group where a level of success is assumed, the more success comes to constitute avoiding failure. Nobody there is expected to do anything special. They all fear screwing up. A problem with this kind of success is that, like the luster of pearls, it confers no real distinction. 3c6

The famous dead in the Iliad share a tenous, grey, afterlife where they drift like shadows. With scholars, I take this afterlife to represent their reputations. "Better to be a slave in the world of mortals than a king in the land of the dead." warns the shade of Achilles in his final appearance. 3c7

It seems to me that a certain disatisfaction is built into such success for many Americans. It is never exactly your own. It has some of the attributes of failure. 3c8

7390 Distribution 1

Donald C. (Smokey) Wallace, Richard W. Watson, Don I. Andrews, Nancy J. Neigus, Michael R. Plesset, L. Peter Deutsch, Duane L. Stone, 1a
James H. Bair, A. Jim Blum, Meredith(Reddy) E. Dively, Jeanne M. Leavitt, Rodney A. Bondurant, Jeanne M. Beck, Mark Alexander Beach, Judy D. Cooke, Marcia Lynn Keeney, Carol B. Guilbault, Susan R. Lee, Elizabeth K. Michael, Charles F. Dornbush, Elizabeth J. (Jake) Feinler, Kirk E. Kelley, N. Dean Meyer, James E. (Jim) White, Diane S. Kaye, Paul Rech, Michael D. Kudlick, Ferg R. Ferguson, Douglas C. Engelbart, Beauregard A. Hardeman, Martin E. Hardy, J. D. Hopper, Charles H. Irby, Mil E. Jernigan, Harvey G. Lehtman, Jeanne B. North, James C. Norton, Jeffrey C. Peters, Jake Ratliff, Edwin K. Van De Riet, Dirk H. Van Nouhuys, Kenneth E. (Ken) Victor 1b

DVN 29-DEC-73 11:26 7390

Project Management Seminar

(J7390) 29-DEC-73 11:26; Title: Author(s): Dirk H. Van Nouhuys/DVN;
Distribution: /SRI-ARC NJN MRP LPD DLS(nothing to do with RADC, but I
know your interesed inmanagemnt.); Sub-Collections: SRI-ARC NIC RADC;
Clerk: DVN;
Origin: <VANNOUHUYS>SEMINAR.NLS;5, 29-DEC-73 11:17 DVN ;

Dirk H. van Nouhuys
Augmentation Research Center
Stanford Research Institute
Menlo Park, California 94025

To:
Access Copy

7390

Mouse and Keyset, Codes and Cases

Mouse and Keyset, Codes and Cases 1

Mouse Buttons:	000	010	100	110	
Case:	-0-	-1-	-2-	-3-	2
Keyset Code					3
00000		CD	BC	BW (CA=001)	4
00001	a	A	!	show one level less	5
00010	b	B	"	show one level more	6
00011	c	C	#	show all levels	7
00100	d	D	$	show first level	8
00101	e	E	%	referenced stmnt level	9
00110	f	F	&	recreate display	10
00111	g	G	'	show branch only	11
01000	h	H	(	show all branches	12
01001	i	I	)	show content passed	13
01010	j	J	@	show all content	14
01011	k	K	+	discard until first pass	15
01100	l	L	-	show plex only	16
01101	m	M	*	statement numbers on	17
01110	n	N	/	statement numbers off	18
01111	o	O	↑	frozen statements on	19
10000	p	P	0	frozen statements off	20
10001	q	Q	1	show one line less	21
10010	r	R	2	show one line more	22
10011	s	S	3	show all lines	23
10100	t	T	4	show first lines only	24
10101	u	U	5	no defer display	25
10110	v	V	6	defer recreate display	26
10111	w	W	7	all lines, all levels	27
11000	x	X	8	one line, one level	28
11001	y	Y	9	blank lines on	29
11010	z	Z	=	blank lines off	30
11011	,	<	[	(nothing)	31
11100	.	>	]	(nothing) ARC 9/9/71	32
11101	;	:	←	(nothing)	33
11110	?	\	ALT	centerdot	34
11111	SP	TAB	CR	(nothing)	35

DVN 13-OCT-71 15:53 7390

Mouse and Keyset, Codes and Cases

(J7390) 13-OCT-71 15:53; Title: Author(s): Dirk H. van Nouhuys/DVN; Distribution: Harvey G. Lehtman/HGL; Sub-Collections: SRI-ARC; Clerk: DVN;
Origin: <VANNOUHUYS>WIDEVIEW.NLS;5, 11-OCT-71 9:21 DVN ;

The NLS version brought up 7/9 differs from that described in (Journal,7329) in the operation of the following features: 1

LINES BETWEEN STATEMENTS 1a

Y viewspec now works. 1a1

REENTER 1b

The executive command REENTER now works. If you have excute quit, REENTER returns you to the exact point where you quit. 1b1

Syntax: @ REE CR. 1b2

STATEMENT SIGNATURES 1c

Viewspecs K & L now work. 1c1

7/9 NLS

(J7391) 9-JUL-71 16:51; (Expedite) Title: Author(s): Dirk H. van Nouhuys/DVN; Distribution: L. Peter Deutsch, James G. Mitchell, Alan C. Kay, Marilyn F. Auerbach, Walter L. Bass, Roger D. Bates, Mimi S. Church, William S. Duvall, Douglas C. Engelbart, Beauregard A. Hardeman, Martin E. Hardy, Fred P. Hocker, Charles H. Irby, Mil Jernigan, Harvey G. Lehtman, John T. Melvin, Jeanne B. North, James C. Norton, Bruce L. Parsley, William H. Paxton, Barbara E. Row, Kenneth E. Victor, Don C. Wallace, Richard W. Watson, Don I. Andrews, Dirk H. van Nouhuys/LPD JGM ACK MFA WLB RDB MSC WSD DCE BAH MEH FPH CHI MEJ HGL JTM JBN JCN BLP WHP BER KEV DCW RWW DIA DVN; Keywords: nls chnages REENTER viewspecs; Sub-Collections: ARC; Clerk: DVN;
Origin: <VANNOUHUYS>OF.NLS;1, 9-JUL-71 16:41 DVN ;

L10 Note

I had to go back to version 38 of L10 again...version up looped when compiling intnls. 1

L10 Note

(J7392) 12-JUL-71 9:15; (Expedite) Title: Author(s): William S. Duvall/WSD; Distribution: William H. Paxton, Mimi S. Church, Charles H. Irby, L. Peter Deutsch, Harvey G. Lehtman, Bruce L. Parsley/WHP MSC CHI LPD HGL BLP; Sub-Collections: ARC; Clerk: WSD;

ARC Seminar #1 - TENEX

Document #7393 has been zapped. It will be restored as soon as possible. 1

WSD 2

BLP 12-JUL-71 14:04 7393

ARC Seminar #1 - TENEX

(J7393) 12-JUL-71 14:04; (Expedite) Title: Author(s): Bruce L. Parsley/BLP; Distribution: Marilyn F. Auerbach, Martin E. Hardy, Don I. Andrews, William S. Duvall, Barbara E. Row, Fred P. Hocker, Cindy Page, Jake Ratliff, Beauregard A. Hardeman, Jeanne B. North, Charles H. Irby, Walter L. Bass, Mimi S. Church, Kenneth E. Victor, J. D. Hopper, John T. Melvin, Richard W. Watson, Douglas C. Engelbart, Mil Jernigan, Ed K. Van De Riet, James C. Norton, Roger D. Bates, William H. Paxton, Harvey G. Lehtman, Don C. Wallace, Jeffrey C. Peters/MFA MEH DIA WSD BER FPH CXP JXR BAH JBN CHI WLB MSC KEV JDH JTM RWW DCE MEJ EKV JCN RDB WHP HGL DCW JCP; Sub-Collections: ARC; Clerk: BER;
Origin: <PARSLEY>SEM.NLS;5, 10-JUL-71 13:05 BLP ;

DIA 12-JUL-71 14:23 7394

response memo

response study memo 1

Recent accomplishments: 1a

Enough information is being collected in the monitor to compute the following: 1a1

per cent drum busy 1a1a

per cent disk busy 1a1b

drum queue length 1a1c

disk queue length 1a1d

per cent of time the scheduler spends waiting on the disk 1a1e

The user program now prints out the average values over the duration of a sampling run. 1a2

Using the above we can now estimate the average drum and disk transfer time. 1a3

Dan Murphy understands the core-overreserved problem when lots of users are using the same subsystem. He said he will work on it. 1a4

The parameter for the number of free pages to be retained in the system has been changed from 66 to 25 (NRPMIN, minimum number of pages on replacible queue). 1a5

It was clear that we were making rather poor use of memory. This helped. The system seems to have more jobs in the balance set on the average. 1a5a

The parameter for the maximum time to page fault was changed from 66 to 20 ms. This should keep large working sets a little smaller and make better use of memory. It should not affect NLS adversly. 1a6

a few results: 1a7

The drum is usually about 30% to 40% busy, with the drum queue about 4 to 7. Drum transfer time is about the same as the old drum driver - about 6.5 ms average. Tests showed that with the drum 90% busy the transfer time went down to about 4.9 ms. 1a7a

The disk is usually about 40 - 50% busy, but with long periods of 100% busy -- it is used primarily in bursts. The queue varies from 0 to 25 and averages around 5 or 6. Transfer times are near 200 ms. on the average. 1a7b

Reducing the NRPMIN (free pages) parameter reduces the time spent in the garbage collector, but increases I/O wait time. It also increases slightly the number of jobs in the balance set. 1a7c

In the mill: 1b

A new version of NLS will dismiss itself for a very short time at the completion of each command. This is primarily to get NEWST to adjust the status of the fork. This should make response more regular. The primary reason however, is to reduce the estimated working set size for the NLS fork. 1b1

Also, the new NLS will map many file pages into its map (like 96 instead of 32). The result is that more of the file will be kept on the drum, and once the file page is accessed, future accesses will be very fast. It should reduce disk traffic also. 1b2

The statistics gathering code in the system will be expanded to give the time a fork spends waiting on the go list before entering the balance set (broken down by queue number). This will hopefully give some indication of response, which was not evident in the statistics before. 1b3

Also, we are going to collect the number of RUNNABLE jobs in the ballance set since we don't know how many are waiting for a page and not runnable. 1b4

The statistics gathering code in the monitor must be changed to look at DRUMP and figure out which drum we are running on. 1b5

The elevator algorthm is being put in the disk driver to minimize head movement. This should shorten the average disk transfer time. 1b6

Things to think about trying: 1c

It appears that jobs that page fault on a disk page are not removed from the balance set necessarily. If we remove the job, it will free up balance set pages. 1c1

Might try rescheduling on a page read complete. This would

introduce a little more scheduler overhead but it would not be serious, and it may increase response. 1c2

By the same token we might rescheduling on quantum overflow with 1 ms. resolution instead of 16 ms. resolution. 1c3

NEWST does two "funny" things which we might try taking out: 1c4

If a fork spends less than 100 ms. on the wait list, NEWST does nothing for him. 1c4a

Every fork is fudged to have priority equal to queue zero for one queue zero length of time. 1c4b

DIA 12-JUL-71 14:23 7394

response memo

(J7394) 12-JUL-71 14:23; (Expedite) Title: Author(s): Don I. Andrews/DIA; Distribution: William H. Paxton, Charles H. Irby, Richard W. Watson, John T. Melvin, Kenneth E. Victor, Don C. Wallace, J. D. Hopper, James C. Norton/WHP CHI RWW JTM KEV DCW JDH JCN; Keywords: response; Sub-Collections: ARC; Clerk: DIA;
Origin: <ANDREWS>MEMO.NLS;1, 12-JUL-71 9:09 DIA ;

NLS Note

For the sake of consistancy, I changed aplit to litdsp, and tspt to tsprt. ldrdrv etc. reflect this change 1

NLS Note

(J7395) 12-JUL-71 21:49; Title: Author(s): William S. Duvall/WSD; Distribution: Walter L. Bass, Mimi S. Church, J. D. Hopper, Charles H. Irby, Harvey G. Lehtman, Bruce L. Parsley, William H. Paxton/WLB MSC JDH CHI HGL BLP WHP; Sub-Collections: ARC; Clerk: WSD;

Journal Error

Bruce... 1

Due to an error in the Journal System, the the document 7393 (from Parsley's SEM.NLS) has been lost. 1a

Please see me about fixing things up. 1b

Thanx...Bill 1c

WSD 13-JUL-71 8:33 7398

Journal Error

(J7398) 13-JUL-71 8:33; Title: Author(s): William S. Duvall/WSD; Distribution: Bruce L. Parsley/BLP; Sub-Collections: ARC; Clerk: WSD;

DVN 13-JUL-71 9:18 7399

Some Plans for Training non-ARC Users during NIC Stages 1 & 2.

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DVN 13-JUL-71 9:18 7399

Some Plans for Training non-ARC Users during NIC Stages 1 & 2.

General 1

I intend this journal entry to bring you up to date on my thoughts and plans about training non-ARC users of TNLS at our site during NIC stages 1 & 2. In doing so I take your course outline (journal,7262) as a baseline. Two specific classes are on the horizen, one in July which I will teach to 2-4 students with a little help froom you and John, and a second in August similar in operation to the one we taught in June. 1a

The July Course . 2

The July Course Should cover the material in (journal,7262) with minor addtions and changes in order. I expect to cover th items myself except for general introduction by you and matters having to do with Telnet and Imp by John. 2a

Workbooks 3

I am writing, polishing, or moving from hard copy online, a group of workbook files. I am setting them up so a student can put them out through output device teletype in a form which will then guide him step by step in online practice. Five files are in various stages of planning or completion: 3a

(vannouhuys,xparcop,) is an exercise in manipulating partial copies. It ran in the June course where some bugs appeared. I am fixing them. Estimated hours to completion:2 Changes in file handling when NLS goes on top of the TENEX Executive will alter or obviate these exercises. 3b

(vannouhuys, xed) is a set of instuctions which leads a studeent through a representative, co-ordinated series of editing commands with feedback and comment each step of the way.Necessarilly it also exercises adressing. A similar wrokbook was brought nearly to compeltion earlier in the year, but the language has changed considerably as have demands of format and the selection of commands to be tuaght. Uncertain estimte of hours to completion:24. 3c

(vannouhuys,xprint) illustrates the use of selected output processor directives. The selection includes those that appear in the TNLS manual plus a few others. Xprint will show comments that pint out when directives are set to print out so the student can find out what happened. A preliminary version operated in the June course. Estimated hours to compeltion:4. 3d

(vannouhuys,xview) will exercise a selection of viewspecs appropriate to TNLS. My rough idea is to set up a file so

that as different views are printed at the terminal,statements appear which name the change in view that revealed them. Nothing exists but plans in my head. Estimated hours:15. 3e

(vannouhuys,xchange)An exercise file for viewchange. I don't have a clear plan for it yet. 3f

Station agent Course vs Laison Man course 4

The only items I can see cutting from the June course outline (Journal,7262) to modify it for Station Agents are the dicussions of partial copies, and of viewchange. In practice Station Agents would not ask so many challenging questions, which would save a little time on each item. That time would be devoted to more practice. 4a

The most diffcult subject seems to me the journal. The command language is getting pretty complicated, and it woul be nice to save teaching part of it. Yet we expect Station Agents to enter journal items. We should talk about what, if anything, they don't need to know. e. g. perhaps they don't need to be able to enter new users. 4b

One-day versus two-day course: 5

The course is a matter of introduction to an integrated list. The list can't be shortened much. The only items I can see leaving out entierly are those on the second morning (journal,7262,12c) excepting the journal. That is: append, breakstatement, viewchange, and X set. The price we pay for shortening the course is less familliarity on the part of the users, hence more troubles and questions that have to be handled over the net. 5a

DVN 13-JUL-71 9:18 7399

Some Plans for Training non-ARC Users during NIC Stages 1 & 2.

(J7399) 13-JUL-71 9:18; (Expedite) Title: Author(s): Dirk H. van Nouhuys/DVN; Distribution: Richard W. Watson, James C. Norton/RWW JCN; Keywords: NIC Training Workbooks Station Agents; Sub-Collections: ARC; Clerk: DVN;
Origin: <VANNOUHUYS>JULYCOURSE.NLS;11, 13-JUL-71 9:08 DVN ;

JWM 13-JUL-71 10:08 7401

COMMENT ON TRYING THE NET

JWM 13-JUL-71 10:08 7401

COMMENT ON TRYING THE NET

JOHN, BBN REFUSES CONNECTIONS, IS IT YOU OR THEM.

ALSO, A WAY OF GETTING AT NETWORK STATUS WOULD BE NICE.
HOW ABOUT SOME GLIDING IN THE NEXT COUPLE OF WEEKS? 1

JWM 13-JUL-71 10:08 7401

COMMENT ON TRYING THE NET

(J7401) 13-JUL-71 10:08; Title: Author(s): John W. McConnell/JWM; Distribution: John T. Melvin/JTM; Keywords: ; Sub-Collections: NIC; Clerk: JWM;

NLS Catalog Programs and Sysgd. 1

A series of catalog producing programs have been written which operate on NLS L10 Files. 1a

With these programs it is possible to : 1a1

(a) Generate a catalog of all procedures used in NLS. 1a1a

The format of this catalog may be either: 1a1a1

(1) A plex of statements containing lists of links to the procedures (500 characters/stmt max) 1a1a1a

(2) A plex of named statements, each statement containing a link to the procedure whose name it has. (see -- NLS, SYSGD,) 1a1a1b

(b) Using the catalog in the format (1), process an L10 file and produce a catalog following the FINISH statement containing entries for all procedures called in the file (see--NLS, AUXCOD, fjcat) for an example. 1a1b

(c) Given a format (1) catalog, produce a format (2) catalog. 1a1c

In order to produce a local ctalog in an L10 File: 1b

(a) Load the File (nls, catprogs, 2); 1b1

(b) GOTO L10 on branch 2 (has appropriate comment as stmt 2) 1b2

(c) Load L10 File 1b3

(d) Print Branch 0 with i viewspec. 1b4

This will insert two branches into the file followign the FINISH statement, (catalog) which will be a format (1) catalog, and (fcat) which will be a format (2) catalog. 1b5

In addition, it will report any procedures called which are not in the catalog (nls, nlscat,), and not in the L10 file being processed. 1b6

If there are any procedures in the L10 file being processed which are not in the global catalog (nls,nlscat,), an entry is made in the global catalog for te procedure. 1b7

As each procedure in the file is scanned, its name is typed to let you know where it is. 1b8

After all of the file has been scanned, the message 'Formatting' tells you that it is formattig the file fjcat. 1b9

The process is roughly the same speed as a compilation. 1b10

In order to do any of the other things, call WSD until further documentation is provided. 1c

WSD 13-JUL-71 12:11 7402

NLS Catalog Producing Programs and Catalogs

(J7402) 13-JUL-71 12:11; Title: Author(s): William S. Duvall/WSD; Distribution: Walter L. Bass, Mimi S. Church, J. D. Hopper, Charles H. Irby, Harvey G. Lehtman, Bruce L. Parsley, William H. Paxton/WLB MSC JDH CHI HGL BLP WHP; Keywords: NLS Software Augmentation; Sub-Collections: ARC; Clerk: WSD;

APPENDIX A: An Introduction to the Structure and Evolution of NLS

The Stanford Research Institute, Augmentation Research Center (ARC), On Line System (NLS) has not been designed to solve a specific task such as electronic circuit design, but rather has been evolving to provide a broad base of capabilities to serve as the core of what one could consider an "intellectual workshop." The term "workshop" has been chosen because it implies a range of general and specific tools that can be applied in various orders to raw material to produce new tools or other finished products. The raw materials for the NLS workshop are symbolic representations: text, pictures, or computer code, for example. Examples of finisned products are new computer tools, reports, plans, or representations to be sent to specialized processors, such as electronic circuit simulators.

In the development of means to augment human intellect, we must have more than just tools. We need methods, procedures, languages, and training for their use, as illustrated in Figure 1. The research and development at ARC is as concerned with these other facets of augmentation as with tool development. This description is, however, concerned primarily with the tool development aspect of the work.

A basic intellectual workshop is a place where one can create, store, and retrieve symbolic material, manipulate it online, create hardcopy output, plan, communicate, and coordinate with associates, access special outside services, and create and add new tools.

What is needed is a set of basic capabilities which can be easily added to by both computer system programmers and application-oriented users; these basic capabilities also need to be able to be combined in various ways to solve specific information processing problems.

NLS can be viewed as a modular system consisting of basic modules that can call upon each other to perform various tasks. One highly simplified graphic way to represent NLS is with the structure shown in Figure 2, where modules can communicate data and control information between each other, a file system, and the outside world. Figure 2. is not to be interpreted to mean that NLS directly controls multiple user terminals, but rather that NLS can communicate with a range of terminals through the base timesharing system.

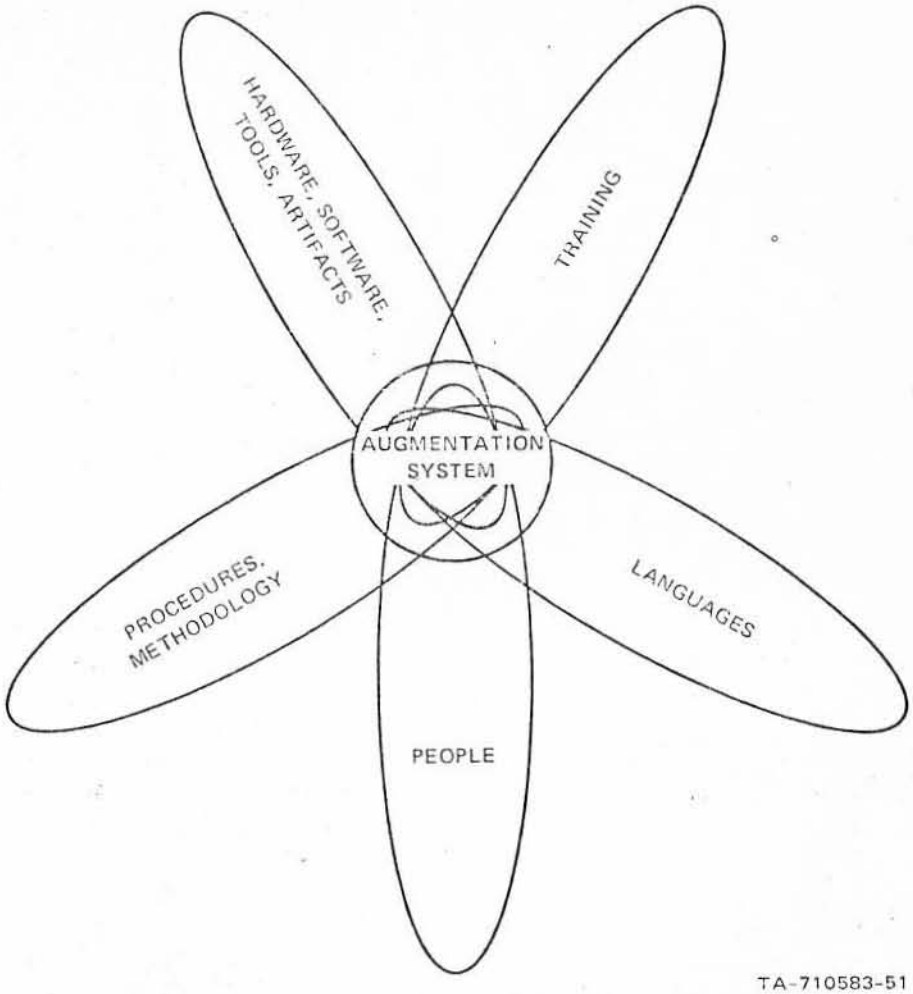

FIGURE 1 ELEMENTS OF AN AUGMENTATION SYSTEM

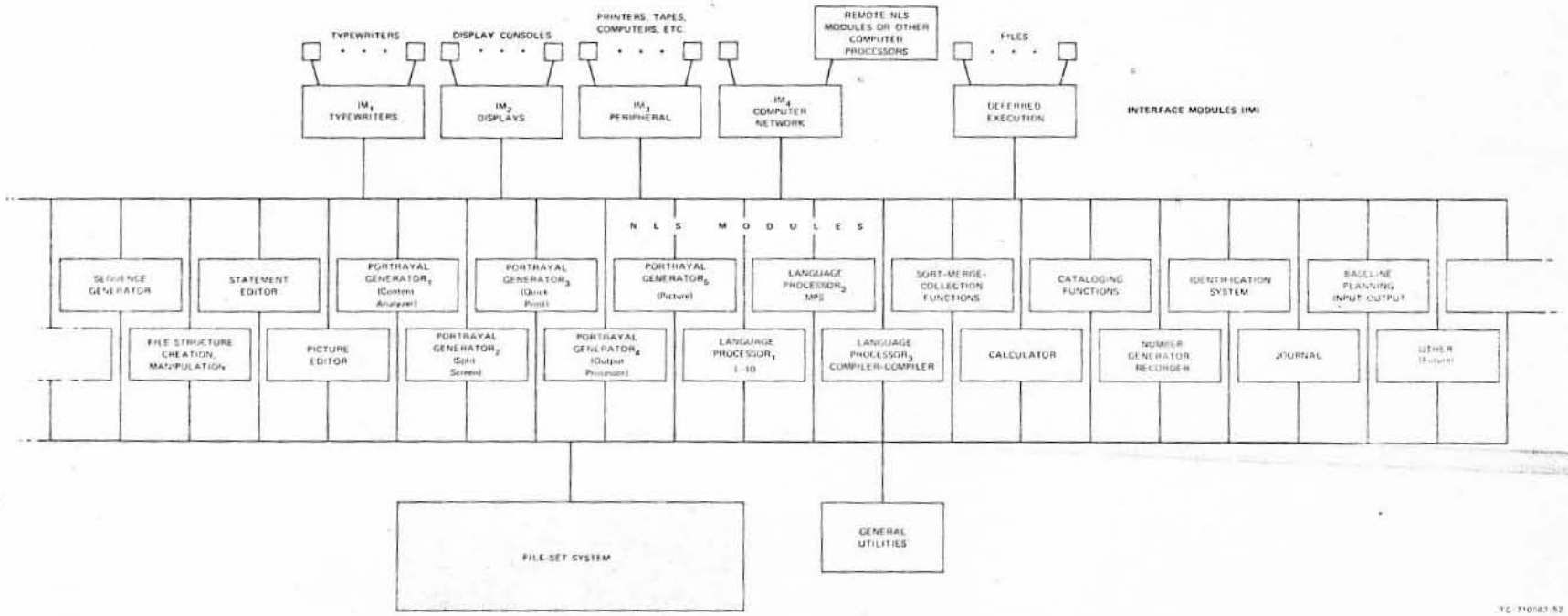

FIGURE 2 HIGHLY SIMPLIFIED VIEW OF BASIC NLS MODULES AVAILABLE TO THE USER DIRECTLY OR FOR COMBINATION INTO GENERAL OR SPECIFIC APPLICATION SYSTEMS

APPENDIX A: An Introduction to the Structure and Evolution of NLS

A few brief words about the modules in Figure 2 are useful at this point. NLS in its actual implementation is a more general graph of interconnected modules than shown in Figure 2, and specific modules shown may be composed of submodules.

At the heart of the system is the File-Set System. Files are structured as trees to any depth and breadth. The nodes of the trees contain symbolic material, currently text, but in the near future other representations, property lists, arrays, or compiled code, for example. The files can contain inter- and intra-file links between nodes. The user's view can be moved in the system within a tree or along links. The system is now being generalized so that files and parts of files will be special cases of more general entities with the characteristics of Sets.

NLS is being structured in a modular fashion so that new tools can be easily added and so that modules of NLS can run on other computers in the ARPA Network and communicate with the main NLS machine at ARC. Commands to various modules in an appropriate sequence to perform a particular information processing task can enter the system from online consoles or from control files.

Output in NLS is under control of the portrayal and sequence generators, which allow users to view online, or by offline hardcopy, the information in the File-Set System with various views from, for example, the file as it is, various truncated views of the file, to complete transformations of the information. Multiple online views of the same file or several files are available at display consoles with the split-screen mechanisms.

Programming languages are available that take source code directly from NLS structured files for use in creation of the modules and for use with some modules.

General sort-merge-collection functions are available for forming sets of information and for manipulation of sets of files. These functions are important in any general information processing tasks.

The Calculator is a module offering desk calculator functions and can take its operands from points in NLS files and return results to points in NLS files.

Cataloging functions are available for keeping track of various entities, documents, products, and other intelligence information. This system has features unique to itself but makes use of other modules in NLS as well.

The Journal is a system that allows people to send information in online and offline files, parts of files, and messages to each other and automatically creates catalog entries for the entities communicated so that people can later refer to these documents, and find out who is interested in what topic and what is known in the system about various topics. The Journal and the other modules it uses are part of an evolving Dialog Support System to augment the communication and planning of groups of people.

A Number Generator and Recorder generates unique numbers and records information on their intended use which is used in cataloging and in the Journal.

An Identification System records information about people and sets of people important to the system such as name, address, and their capabilities with respect to the various system functions. This system is used by various modules of NLS, but particularly by the Journal.

The Baseline Planning System utilizes a set of functions and procedures to record relevant information about the tasks under development or planned, aids the allocation of resources to tasks, and records pointers to current design information.

Given the above basic modules, one can create a wide range of application augmentation systems by developing the methods, procedures, training, and language for their use. Use in a new application area may also require a new specific module or further evolution of an existing module or modules. The above effort can be very simple or more involved and imaginative than that required to create the basic tools. It is important that experience in each application be generalized and fed back into the further evolution of the NLS workshop.

The research and development involved with the tool part of the NLS workshop evolution is:

(1) To create the mechanisms to impose the NLS machine onto the structure of a conventional available timesharing system. This may require extensive modifications to the base timesharing system.

(2) To create the higher level languages to describe and program the NLS machine so that it can be modular and be easily expanded.

(3) To develop and evolve a general file-set information storage structure that allows efficient storage and association of a range of symbolic material, i.e., text, pictures, and code properties.

(4) To determine the basic online-offline portrayal mechanisms required for viewing and studying the NLS symbolic material.

(5) To develop the mechanisms for aiding the planning, communicating, and coordinating of symbolic material and people activities.

(6) To develop mechanisms for combining basic general processes to produce general and specific application-oriented processes.

(7) To provide mechanisms for communicating NLS representations to other computer systems offering specialized services that can be used with the special capabilities of NLS or can be called upon by NLS processes.

(8) To develop the mechanisms that can effectively use the potential distributed capacity of a computer network.

The service aspect of NLS evolution is to provide NLS services reliably and efficiently. This requires attention to:

(1) System measurement and tuning

(2) Architectural design for easy expandability and debugging

(3) Proper liaison with users

(4) Operational procedures, methods, and training

The basic NLS modules described above are in existence or under development, but there is much evolution required at all levels of system development from methodology and training through NLS modules to the underlying timesharing system hardware, software, and operations to provide the online-offline intellectual workshops that we know are possible.

APPENDIX B: NIC Development--Function and Operational Delivery

APPENDIX B: NIC Development--Function and Operational Delivery

Network Information Center

At present we view the Network Information Center (NIC) as a reference and dialog support service. It has provided these services since the Fall of 1970; in June of 1971, we began to provide services online as well. The Augmentation Research Center (ARC), of which NIC is a part, has been developing a wide range of capabilities. We only consider those capabilities that are directly related to the reference and dialog support functions as part of NIC. The services of the NIC are available to all network sites and to stations not on the network that are participating in the network design or operation.

We plan to offer other services, such as system documentation aids, over the network to the network participants. However, because of limited people and hardware resources, we cannot make them generally available. We plan to work with sites or groups, such as Educational Information Network (EIN), that may assist sites on the network to prepare documentation, where these services can have the greatest value and impact. These types of services we do not consider a direct part of NIC.

The network is a distributed collection of people and computer system resources.

A function of the NIC is to help this geographically distributed group collaborate with each other.

A function of the NIC is to help people with needs find the people, system, or information associated with the Network that can help them.

During the coming contract period we propose to continue to improve and expand the online and offline services offered through the NIC. Our present three-stage timetable for providing online service calls for a basic NIC to be operational by October 1971. At that time the following are expected to be in operation:

APPENDIX B: NIC Development--Function and Operational Delivery

Online Capabilities

We expect to be able to support about 8 network typewriter terminals using the ARC On Line System (NLS). We are currently measuring the system performance and considering ways to increase the capacity either with software system changes or with changes in the hardware configuration.

Network users will be able to use NLS to prepare messages and documents, such as the NWG, Request for Comments (RFC's), These messages will be distributed online to files at NIC associated with users and/or hardcopy through the mail. If standard protocols are implemented through the Network, there may be automatic transmission to people at other sites through their local file system or terminal.

These documents will be automatically recorded as an aid to the cataloging process.

The above online capabilities form a basic dialog support system which provides for collaborating groups a place to record their plans and designs, annotate contributions of others, make synopses of records relevant to specific issues, and make contributions to the evolution of plans and intellectual formulations that are efficiently and appropriately integrated and connected to the entire record of their groups' activity.

They allow using the facilities of NLS; they allow people to browse in the record to arrive quickly at the status of a formulation that is being documented through the dialog support system.

Using the basic catalog facilities allows others to find out who is interested in what subjects and to be quickly brought up to date.

Interspersed with the above capabilities, extended NLS features enable people to retrieve information from the record, modify it, update it, and return it to the record without destroying the original.

We also plan to allow users to prepare documents either on their local systems or offline and then have them transmitted to NIC for further manuipulation, distribution, and cataloging.

Documents prepared at NIC or transmitted to NIC will be stored on the NIC disc, on archive tape files at NIC or on archive files at other sites, offering file storage services. These documents can be retrieved for online browsing or for transmission to files at other sites for printing and other uses. (Work in this inter site file transfer area will probably continue into the next contract period.)

Reference files that will be online are:

The Network Resource Notebook.

The Current Network Protocols.

The listings and indexes in the Catalog of the NIC Collection.

The Directory of Network Participants.

Documentation of NIC services.

Host Status.

Other files needed for network reference can also be created and made available online.

Initially our surveys of network users show that access to the NIC will be predominately through the slow limited-character-set Model 33 Teletype. This will restrict use of our system for extensive online browsing and general reading of online documents; therefore hardcopy production and distribution will be a vital function for some time.

Offline Capabilities

We will continue to offer the following offline services:

Dialog support in the form of hardcopy duplication and transmission to the NIC Station Document Collections at remote sites and to the Technical Liaisons.

Assistance to Station Agents in handling their hardcopy collections and in other NIC-related matters.

Hardcopy distribution of the NIC Collection Catalog, Network Protocols, ARPA Resource Notebook, Directory of Network Participants, Mailing List, and other network-wide Functional Documents.

Distributing and updating to Station Collections and cataloging of Functional Documents, documenting facilities and services available at each site. Such documents could also be transmitted to us for online storage and retransmission to files at remote sites (the latter after October).

Maintaining a full hardcopy NIC collection at ARC containing documents considered to be of interest to network participants. Those documents not in the station collection can either be obtained from NIC or a reference can be given on where to obtain the document directly. Policy in the area of the extent of the NIC Collection and whether or not we should be involved in the distribution of books and reports needs to evolve.

Another service provided is training in the use of NLS and other NIC facilities. A two-day course for initial users of the NIC was given at SRI on June 16-17, with others planned for late July and early Fall.

The above offline and online services are a basic, but useful set, but will not meet the needs of the expanding community of network users without continuous improvement in our NIC operating procedures, and evolution and expansion of services and support facilities.

It is important to emphasize strongly that NIC is a very general information handling service that requires both people and computers to support its functions. Computer people often tend to ignore the amount of effort required to handle and process information before it gets into the machine and when it comes out. There is also much effort required to work with both the originators of the information and the end users of the information.

APPENDIX B: NIC Development--Function and Operational Delivery

The NIC is communicating, recording, retrieving, reformatting, proofing, and recommunicating information in several media: telephone, in-person, online and offline typewriter, online CRT console, computer- and noncomputer-printed documents. Procedures for performing these activities in an integrated fashion have not been developed by other information services. These procedures must be worked out in a rapidly changing environment. Therefore people must be aware of the man-time required to work out appropriate procedures and methodology.

Period from October 1971 to the End of the Current Contract Period (February 7, 1972)

One interesting problem we are going to face during this period will be:

We can provide some limits on file space a site can have and we can limit the number of lines active at any moment from a given site, but we can have little control over what individual users do when they come into us.

We would like to encourage people to send short messages or small documents and not use the NIC facilities, without special arrangement, to write , for example PhD dissertations, or extensive manuals of their systems that would tie up network lines for long periods of time and thus keep others with messages off the system.

During this period we will:

Continue to gain operational experience and improve our operational procedures.

Continue work on handling remote and archival files.

Work toward providing access to the display version of NLS (DNLS)-- initial access will be for sites with modified IMLAC displays; later we plan to produce specifications that will allow sites with other types of displays to gain access to DNLS.

Begin planning for the new contract period in more detail

APPENDIX B: NIC Development--Function and Operational Delivery

Directions for the Next Two-year Contract Period

Major points of emphasis will be as follows:

Continue to work with the Network Working Group, particularly in those areas vital to the NIC such as graphics, file transfer, distributed data management, and accounting.

Expand our ability to provide basic reference and dialog support for the increasing numbers of network users and groups who will be coming on the net.

This expansion will require development of:

Methodology

Procedures

Training procedures for new operational staff

Modifications to systems and other tools to meet the increased use.

We cannot overemphasize the effort required to scale up a pilot or prototype function to real operational use by many people.

Examples of groups who will want to collaborate as the Network Working Group is now doing are:

The meteorological community planning to use the ILLIAC IV

The speech recognition community

The graphics community

The various subgroups of the system design community.

Reorganize our hardware and software system to enable smooth expansion as the need arises.

Get our resource accounting of both people and machine resources in shape so as to be able to know what each operation and service is costing.

APPENDIX B: NIC Development--Function and Operational Delivery

As new dialog support functions are developed and tested on the research side of the house, move them into operation in the NIC.

Examples of functions under development or being considered.

Sets--the ability to find those items in the dialog universe relevant to one's interest and view them in many ways.

Backlinks--to find out which other items are referencing each item.

Split-screen--(for DNLS users) to study two or more items at once and operate on them.

Ability to build sub catalogs of dialogs--related to sets.

Dialog with files distributed in many hosts throughout the network--There are many problems that would have to be solved such as assuring that files did not get deleted and keeping track of where things are in our catalog, to help reduce the load on NIC.

Action items--ways to enter a dialog item requiring action by a certain date and having the system remind the sender to follow up or check to see whether the receiver responded.

Provide improved querying capabilities for the online reference files such as the:

NIC catalog

Network Resource Notebook

The Current Network Protocols

Records of site status

Documentation of site facilities and services

Networkwide and personal files of people interested in various research topics

For example the ILLIAC IV project has 2000 people on their mailing list of interested people.

Question--is it likely as time goes on that a project such as ILLIAC would want an organization such as NIC to take over its printing and mailing to all these people?

We have already been approached by a person from Project MAC to find out whether we could handle a similar function for them.

Possibly provide a facility to ask questions for online updating of site status or other files that are changing over a short period of time.

Continue to improve making information available by preparing weekly notices of new additions to the NIC collection.

Prepare specialized bibliographies for subjects of wide interest.

The above services as well as evolving the NIC collection require considerable effort to:

Monitor current literature to select, collect, abstract, and catalog

Design and program to produce such listings from catalog input items

Prepare and distribute

Devise improved ways to handle hardcopy at sites:

As the number of users grows and the number of available services increases, the size of the collections at local sites will increase.

The problems to be solved here are many:

Getting out a dynamically changing catalog on a Monthly basis

This item requires attention to the design of listings and indexes for maximum usefulness

Liaison and supervision of hardcopy production

Recording and proofing

Preparation and distribution

Continual improvement and evolution in the tools required to assist the catalog input and production process.

Handling obsolete items

This function requires continuing manual effort to review the collection.

Distribution of hardcopy over the network to standard printers. (This item will require an ARPA decision. We recommend a system involving a mini-computer and modified printer such as the Clevite. The standard Clevite does not have adequate resolution.)

Training and assistance to station agents

People will not be willing to have just one collection at their site if they have to go any distance to get to it.

This item requires additional recording and hardcopy production and distribution.

The documents relevant to a meteorologist are not those relevant to a member of the Network Working Group and therefore groups will want subcollections tailored to their needs.

This item implies selective dissemination of information:

A design based on existing systems is required

Close liaison with users

Preparation and distribution

More recording

The size of collections will probably require use of microfilm techniques and readers.

Microfilm will be easy and less expensive to produce and will take up little space.

Associated hardcopy facilities are required at sites, and bulk hardcopy facilities are probably required at NIC.

There are many interesting possibilities with microfilm, including:

Computer-controlled frame jumping

Overlay of microfilm and graphic display.

The ability to keep track of a wide variety of media such as slides, audio tapes and, video tapes.

Allow individuals and groups the capabilities of NIC to create and manage their own private collections of information with catalogs and capabilities for entering and proofing items and querying the catalogs.

This item requires basic bibliographic tools beyond those used for producing the standard NIC catalog.

It places more requirements for training and close liaison with users.

Since these users will have online items, possibly scattered in files on other hosts, it would be desirable to provide ways for retrieving them through their catalogs in NIC.

Learning to use all the varied systems on the network is not going to be possible by sending all potential users to each remote site for training or by always bringing instructors to the user's site.

Computer-assisted instruction will be required.

The NIC could provide some basic facilities to enable sites to create data bases for an NIC-supplied teaching program.

An important point not to be lost in all this is the great amount of work required to take many of these obvious ideas and to turn them into smoothly running services. Many details at each level in the system must be worked out for these facilities to go together properly.

<JOURNAL>7406.NLS;1, 15-OCT-71 17:15 JCN ; Title: Author(s): MFA WLB RDB MSC WSD DCE BAH MEH FPH JDH CHI MEJ HGL JTM JBN JCN CXP BLP WHP JCP JR BER EKV DVN KEV DCW RWW DIA JAF;, Richard W. Watson/SRI-ARC RWW; Distribution: James C. Norton/JCN; Sub-Collections: SRI-ARC; Clerk: JCN; Origin: <DOCUMENTATION>J7406.NLS;1, 15-OCT-71 16:59 JCN ;

APPENDIX C: Dialog Support System

APPENDIX C: Dialog Support System

Introduction

The ARC Dialog Support System (DSS) involves techniques for use by distributed parties to collaborate effectively by means of the inter-linked referencing between NLS files, particularly within the recorded-dialog medium of an NLS Journal.

Our DSS will provide the following general online aids: multiwindowed displays; simultaneous and independent mobility and view control among many files; link-setup automation; back-link annunciators and jumping; aids for the formation, manipulation, and study of sets of arbitrary passages from among the dialog entries; integration of cross-reference information into hardcopy printouts.

It also will include people-system developments: conventions and working procedures for using these aids effectively in conducting collaborative dialog among various kinds of people, at various kinds of terminals, and under various conditions; working methodology for teams doing planning, design, implementation coordination, and so on.

Discussion

The Need

ARC has become more and more involved in augmentation of teams, and we are giving serious consideration to improving intrateam communication with whatever mixture of tools, conventions, and procedures will help.

If a team is solving a problem that extends over a considerable time, the members will begin to need help remembering some of the important communications--i.e., some recording and recalling processes must be invoked, and these processes become candidates for augmentation. To consider some of the different conditions where such storage and recall may be useful, suppose Person A communicates with Person B about Item N at Time T.

They may well be counted on to remember their exchange during the problem-solving period. But consider the case of Person C who, it will turn out, is going to need to know about this communication at time TT:

Perhaps he was there at Time T, but

he was too heavily involved even to notice the communication, and/or Item N was not relevant to his work at that moment and so was not implanted for ready recall.

Perhaps A and B did not anticipate his later need and thus failed to invite him into their interchange or inform him of its conclusion.

Perhaps, although Persons A and B knew he would later need the information, they didn't want to interrupt their own working sequence with the procedure of interrupting Person C and getting him involved.

Or, if the consequences of the interchange carry over into a long-lasting series of other decisions, one or both parties may fail to remember accurately, or may remember differently because of different viewpoints, and troublesome conflicts and waste of effort may result. A single person will make a list of things to do on a shopping trip because he has learned that the confusion and pressure may make him forget something important. It is obvious that to be procurer for one of a mutually developed, interdependent pair of lists would make it even more important to use a record.

Further consider the effect if the complexity of the team's problem relative to human working capacity requires partitioning of the problem into many parts where each part is independently attacked, but where among the parts there is considerable interdependence through interactions on mutual factors such as total resource, timing, weight, physical space and, functional meshing.

Here, the communication between Persons A and B may well be too complex for their own accurate recall. For example, their communication period resulted in scratch paper or a chalkboard covered with possibilities and the essence of the agreed-upon solution, which has since disappeared.

We envision effectively augmenting our collaborative team by having an "intragroup documentation system," containing current and thoroughly used working records of the group's plans, designs, notes, etc. Therefore, we have begun to develop a system for entering and managing those records. The ARC Journal is this intragroup documentation system.

APPENDIX C: Dialog Support System

The ARC Journal

Our Journal is an open-ended information storage and retrieval system. It accommodates and retrieves whatever thoughts any member of the group feels worth keeping. All entries in our internal "mail" system automatically become part of the Journal. In addition, any online user may flag any file for transcription into the Journal within a day. In addition to NLS files, other hard copy including photographs, line drawings, and scratch notes can be logged into the Journal. In handling extra-computer copy, the Journal draws on the techniques we are developing for NIC and RINS.

We believe the Journal is the key to the development of our Dialog Support System. We are encouraging members of the group to enter items freely, to err on the side of loquaciousness, even to enter information that will become useless. We hope to learn from such a flow how to winnow worthwhile information, to refine the techniques of query, analysis, and access that are necessary to proliferate all our augmentation research.

As each item (in this case, every NLS file) enters into the Journal, it receives a master Catalog Number (CNUM) and is cataloged.

> The CNUM is generated from the one master-collection sequence that ARC uses for all of its frozen-item storage: XDOC, NIC, Journal, RINS, and, we assume, an increasing number of other special collections. The CNUM becomes the master identifier of the NLS file: it is printed in the upper right corner of each page of a printout of that file; it is the standard reference name to use in an NLS link; and it becomes the "file name" of that file within the storage and retrieval system of the Journal.

When the Journal System takes a file into custody, it guarantees retrieval of that file (by its CNUM) at any later time.

A Master Catalog holds descriptions of each item that is stored in ARC's Master Collection. The Master Catalog is composed of a set of NLS files in which each entry (describing one collection item) occupies one statement whose NLS name is 'M+CNUM--e.g., (M5237).

The catalog entries are formatted in a special way to delimit the different data elements. For instance, for most items there is a "*a1" preceding the first-author's name, and within this type of main field there often are flags such as "#2" or "#3" to delimit a particular subfield. The initials of the ARC author are stored after the data element code "*a6".

We do not really expect to use this format permanently for storing our catalog data. Within a year the size of the collection will make query and file management operations too inefficient and we will change it. A collector sorter and special reformatting programs will reduce the work of designing and changing the new format to several hours at the console.

The organization and formatting of the catalog files will evolve during the next year, but the user's concept of this function probably will not be affected.

Special data elements are under consideration for processing our NLS files into the journal. For instance, it is likely that the catalog entry will involve a record of the whereabouts and the reference target of every cross-file link with the file. Such a notation would be an important aid in querying and is also the base for the "back-linking" we have been considering for so long.

Journal entries now also exist as a shelf of hard copies. For the shelf-stored copies we have used what we call "catalog-management processes," (Executable Text) Programs to help manage and retrieve the information.

The catalog-management techniques that we have used were designed expressly to accommodate special collections. For example, a working subset of the Master Catalog holds the Catalog entries for the items that have been entered in the Journal. This subset is called the "Journal Catalog," and can be extracted automatically from the Master Catalog. Our initial shelving is by Catalog Number, so the shelf list is by CNUM.

We can automatically generate hardcopy citation lists in various layouts by means of a library of reformatting programs. The Collector-Sorter Processor is invoked in one set of executable text programs, to produce listings sorted on selected keys.

One such listing is the shelf list. A Shelf List for a given collection is a list of citations ordered in the way in which the collection items are physically "shelved" or otherwise stored.

If the items are standing on the shelf arranged by catalog number, the user would probably find one easily without looking at the Shelf List. But, if the item is gone, the Shelf List can verify that it should be there.

The items might very well be shelved according to a subject outline--e.g., a set of user-reference volumes whose sections would each be a separate Journal entry. Here the various sections would be updated independently, and their catalog numbers would bear no relation to their ordering within the binders. The Shelf List here would look like a Table of Contents.

An "Index" contains one-line citations ordered alphabetically or numerically on one or more of the terms found in the catalog entries. We automatically produce indices ordered on: Catalog Numbers; Author; and Keywords from the title (having an entry for each nontrivial title word).

We plan to make Journal material ever easier to read online. By next Fall we hope that any NLS user studying a Journal item may jump from a link to any Journal item that has been referenced within the past few days with the speed of disc access, and with a "worst case" time of less than five minutes for a file not used recently.

APPENDIX C: Dialog Support System

Automatic Journal Entry

After the transfer of NLS to the PDP-10, our journal entry and cataloging procedures were made more automatic, and brought under direct user control from NLS.

Entry commands such as the following are used:

Execute Journal

Submit	(file/statement/branch/plex or literal input)
Interrogate	(optional interactive input request mode)
Author	(the user by default, others are entered)
Comments	(optional comments about the document)
Distribution	(to ARC or non-ARC people by name)
Subcollections	(NIC,AFIPS,JOU,NAS,etc..)
Keywords	(at user's discretion)
Expedite	(for 3-4 hour delivery to ARC addressees)
Go	(to start file and catalog process)

Catalog entry, hardcopy formatting, and secure on-line filing of the document are included in this process.

Hardcopy distribution was used for all documents at first. Optional on-line delivery of links (references to the Journal document files) to addressees is planned to follow soon.

APPENDIX C: Dialog Support System

Summary

Our DSS development will be coordinated with our other developments toward serving teams of people involved in developing complex computer-based systems. Hence we will concentrate upon making a prototype DSS that really supports the developers and users of the systems that ARC is developing and operating--such as: NLS, NIC, DSS and, DPCS.

The ARC Handbook is the prototype "super document" see (5220,5b) that our collaborative dialog will concentrate upon for ARC's internal, prototype development of DSS.

As features of DSS are seen to be useful to the NIC system of services, they will be so provided. This will provide us with early experience in the use of DSS features among a larger, distributed community.

For instance, we expect to use link and/or advise features in simultaneous online conference dialog and other working collaboration when and where consistent within NIC goals.

It is assumed that there may be special DSS required for this distributed-community service; we expect to do this sort of work within the "functional-development" part of our NIC activity. Some discussion of the "distributed-dialog" features is to be found in the 7 Dec 69 memo (5220,5e).

<JOURNAL>7407.NLS;1, 15-OCT-71 17:24 JCN ; Title: " Author(s): MFA WLB RDB MSC WSD DCE BAH MEH FPH JDH CHI MEJ HGL JTM JBN JCN CXP BLP WHP JCP JR BER EKV DVN KEV DCW RWW DIA JAF;, Douglas C. Engelbart, James C. Norton/SRI-ARC DCE JCN; Distribution: James C. Norton/JCN;
Sub-Collections: SRI-ARC; Clerk: JCN;
Origin: <DOCUMENTATION>J7407.NLS;1, 15-OCT-71 17:00 JCN ;

APPENDIX D: Documentation Production and Control System

We plan to set up and shake down within ARC a separate PLACE, TERMINAL CONFIGURATION, and STAFF--a system (DPCS) expressly to support production and control of information-systems' documentation--where the support work for developing and controlling ARC's documentation will all be done.

If we need more throughput to shake down the system, and/or if through NIC's activity or through special arrangements with Network groups there is reasonable sense to do so, we would like to consider our supporting of other-group (Network) documentation production and control. We would like to have a humming "business" in this kind of service, to serve well as a test bed for the successive stages of DPC System developments we want to go through.

This support of other groups could be on an experimental trial basis, perhaps prior to their setting up a PLACE, TERMINAL CONFIGURATION, and STAFF for local support of their own work (making use of computer-support from ARC).

In support of this approach, we intend to provide ourselves locally with a hardcopy printout system capable of making good-quality mixed-text/graphic drafts.

We want to coordinate this system with parallel use of a high quality COM system for final publication of documents and microfiche. We expect to use a COM service bureau for such production, but we want our local hardcopy system to be able to produce drafts that are completely accurate representations of all that will be on the final output.

We hope to be able to purchase the front end of an FR-80, up to but not including the high-quality D/A and analog circuitry that drives their high-precision CRT, leaving off these circuits, the CRT, and the camera and film-handling gear. Instead, we may be able to use lower-quality D/A and analog circuits, compatible with the resolution of a Princeton Scan-conversion Tube, whose output would be used for remote video viewing (at one of our video-DNLS consoles), or for driving a local Xerox LDX printer.

See (7273,) regarding this approach.

With this approach we gain the full precision and flexibility of what seems to be the best COM on the market, enabling us to explore completely the range of graphic represenations useful for complex-systems documentation.

It would also allow us to experiment with merging scanned photographic images into our documents, from digitally stored representations, or from film-scanned signals. This provides a potential for programmatic control of image selection from microfiche (microfilm) archives, image magnification and trimming, page-cut positioning, and image overlaying.

This seems to be an important part of the problem of computer-accessed full text of library materials.

The earliest form of a DPCS would have authors working mostly off line.

Clerical support staff can take rough-draft material in any form (e.g., hand written, typewritten, marked-up computer printout, and/or dictation) and quickly type into a local spooling device the text and directives for our DEX (Deferred-Execution) batch processor to operate upon and produce clean, formatted, up-dated printouts.

The computer aids available to the clerical staff make it very easy for them to follow complex alteration markups on prior-printout drafts. In our experience, the total time required for a trained secretary to type the new text/editing input for a significant alteration job and to take care of rolling and feeding paper tape (if that is the spooling means) is considerably less than the online time required by our best-performance DNLS operator to do the same work.

Authors can learn to work quite effectively in this mode for doing their original writing. Usually it can beat longhand, if there are not too many alterations of prior content or organization. It is not nearly as effective, of course, as composing original material with DNLS.

The modification directives used for DEX provide consistent and very effective notation for a longhand writer to use in his script to direct the transcribing secretary in performing the structural reorganizations that come to mind as the writing progresses. A bit of indoctrination in this respect actually provides a good deal of help to the author.

APPENDIX D: Documentation Production and Control System

An initial, self-contained DCPS would contain spooled-input typewriters (off line into cassettes or paper tape, or online into a local computer), a means for batch transmission of spooled jobs to ARC (or a DEX processor in another TENEX), and a means for local hardcopy printout of the fresh drafts. An online typewriter would probably be involved as a minimum support aid, for using TNLS to do miscellaneous immediate editing and controlling tasks. A DNLS console would be an even more useful adjunct.

In our various developments for NIC, DSS and RINS, we have a number of cataloging and indexing techniques that provide extensive help in documentation control. In studying various documentation-utilization environments, we would expect to make steady improvements.

We expect that our prototype DPCS could be mapped across to serve other documentation teams to very good advantage. It should be fairly easy to install an appropriate computer-service support system in another TENEX.

For some such groups, we would like to contract to provide this support as well as the user-system guidance--we believe this approach to have strong advantages toward advancing a coherent domain of computer-aided documentation,

We hope also that some of the early uses of our multiparty NLS-system development system could be in having other parties around the network working on special representations and techniques for types of system documentation of their particular interest.

Subsequent evolution of our prototype DPCS would be towards providing features such as: automatic concordance-type indexing, cross-reference control, glossary control and production, and towards extended representations, new forms of portrayal for use in documenting complex systems, extended facility for composing and modifying the exotic representations, and high-quality font/formatting.

APPENDIX E: Software-Engineering Augmentation System

Introduction

Once a remote site has established a DNLS station that can work with our system through the Network, it would be directly feasible for software engineers, working on other computers with other languages than ours, to use our DNLS system to considerable advantage as a workshop in which to compose, modify, and study their (integrated) source code and documentation, and to participate in computer-aided, collaborative dialog over this material.

With straightforward utilization of our compiler-compiler techniques operable through DNLS, they can easily build special-purpose languages that match to other computers, to other purposes, at binary or assembly-language levels.

We hope to encourage some experimentation in this direction, and intend to round out the prototypical set of conventions, aids, principles, etc. within our application areas that will make such application relatively direct. The extent of such experimentation will of course be limited to what we can manage to support, both with computer service and with people interaction.

Basic Setup for Use of NLS by a Remote Software Engineer

He has his own compilers and debuggers.

We offer him a facility for writing, modifying, and documenting his programs.

Assume that he has a high bandwidth path to us (i.e. the Net), so that display information may be sent to him and, that files may be transmitted to us for initial insertion into NLS, and back to his site for compilation or printing.

The remote user would use display NLS over the Network (perhaps with the interactive parts of NLS running on his own machine to give better response).

His source code would be held in NLS files, which he would edit and study using NLS.

Listings can be obtained through the facilities developed for local printing of NLS files for the NIC. This will include formatting by our Output Processor.

Compilation will involve production of a sequential file that can be sent over the Net to his site for use with a local compiler.

During the production of the sequential file, analysis and reconstructing of the text may be done.

This allows the use of source language conventions that take advantage of NLS without changing the local compiler.

For instance,

the compiler may not accept lowercase letters, so on output all letters would be capitalized, or

the syntax for naming locations can be modified to correspond to NLS's naming of statements, then on output, converted back to the form recognized by the compiler, or

procedure calls may be expressed as NLS links in the source and converted to simple identifiers on output.

It is worth noting that a methodology similar to that described above was used successfully by ARC in transferring NLS to the PDP10.

The main difference was that the compiler was at a remote site rather than NLS.

During the time that ARC was still using the XDS940, compilers developed at ARC were used remotely on Utah's PDP10.

The compilers were first produced at ARC, then transmitted over the Net to Utah.

Programs using those compilers were written with NLS.

They were tested by the steps described above:

production of a sequential file from the NLS file,

transmission over the Net, and

compilation and debugging at the other site via the Net.

When changes were necessary, the source code was modified with NLS, a new sequential file produced, sent to Utah, compiled, etc.

This mode of operation was quite productive in spite of the problems caused by the inexperience with Network use.

More Advanced Use of the Software Tools at ARC

We have described above how the software engineer at another location might use NLS for writing his programs.

It will also be possible for the remote programmer to use other software augmentation tools developed here.

For instance, the TREE META compiler writing system could be modified to produce code for another machine (this was in fact done as part of the transfer of NLS from the XDS 940 to the PDP10). It could then be used to develop experimental compilers that would run on a PDP10 (or through further modifications and bootstrapping, on another machine) and produce files that could be sent over the Net for loading.

The feasibility of such an undertaking will be greatly increased with the development of the Modular Programming System described in Appendix G (7411,).

The compiler-compiler will be composed of modules, so that the code production can be more easily replaced without requiring a detailed understanding of large sections of a complex program.

When it is operational, the MPS itself will be a very powerful tool and of interest to other programmers.

In addition, it will open up new ways for the remote programmer to access and use the other tools at ARC.

It will become possible for the programmer to create a personal version of NLS by the replacement and addition of modules so as to better match his needs.

Other Aspects of the Augmentation System

Independent of the software tools, there is a large incentive for the remote programmer to make use of NLS.

It is important to remember that the programmer is also a manager, if not of a group, at least of himself.

As a manager, he can expect to benefit from using the planning/communication/dialog tools that are being developed at ARC.

In conclusion, it seems both feasible and desirable for the software engineer at another site to make use of NLS in a wide range of his activities.

APPENDIX F: Descriptive Notes about PBMS, a Project Baseline Management System

APPENDIX F: Descriptive Notes about PBMS, a Project Baseline Management System

Our ARC system development team has the same basic needs for planning, coordinating, documenting, and accounting for a constantly changing set of interrelated tasks as do other groups of people working in goal-oriented endeavors.

We constantly face more opportunities for changes or additions to our evolving system than we have resources to carry out. Therefore we must find ways to obtain as effective utilization of our ideas, and of our people, system, and material resources as we can so as to make the best progress toward our goals.

Planning requires a framework within which information about goals, needs, possibilities, resources, and related dialog can be recorded, studied, and modified usefully.

The result of such coordinated analysis is the adoption of a current visible plan, or "baseline" of expected events, agreed upon system developments, their external configurations, and resource allocations.

ARC planning and task activity is currently conducted in the following operational framework:

Operations (Providing services)

- NIC (Operations)
- Computer-System Operations
- Business Operations
- Clerical Support System
- Publication Support System
- Research Intelligence System--RINS (Operations)
- External-Collaborator Coordination

Primary Project-Development Activity

- NIC (Development)
- Computer-System Development
  - Software Engineering (TENEX, NLS)
  - Hardware Engineering
- ARC Organization and Method of Working (Development)
  - Business Operations
  - Clerical Support System
  - Publication Support System
- Team Augmentation (System Development Team)
  - Collaboration (Dialog Support)
  - Baseline Planning System
    - Baseline Record System

APPENDIX F: Descriptive Notes about PBMS, a Project Baseline Management System

Methods, Roles, Terminology
Augmentation of Direct Team Activities
Software-Engineer Augmentation
Operations (Maintenance, Requisitions)
Accounting
Documentation Production
Measurement and Analysis
User Systems Development
RINS (Development)

The Baseline Record is a special subcollection of the Journal. It will consist of a series of files specially formatted to contain task and resource allocation information, including particularly mixed text/graphic files of plans, specifications, analyses, designs, etc.

It will be composed of the portion of our currently accurate working records that represents our best definition of tasks we plan to perform in the future, how we are planning to do them, and what uses of resources (people, system service, materials) are expected.

This record will be produced from central planning data contained in online files at ARC, and will contain various views of that information as needed to give meaningful representation of our situation.

A basic set of Baseline record views includes:

(1) Schedule: by activity group (NIC,NLS,TENEX)

(2) Schedule: all tasks by ARC planning stage

(3) Schedule: all tasks by person

(4) Baseline record by task, formatted as "status" report, with elements such as:

Information: (about nature of task and agreements)

Buyer(s): (for whom or what task is this task being performed)

Requirements: (agreed upon needs this task will fulfill and certain design criteria as needed)

APPENDIX F: Descriptive Notes about PBMS, a Project Baseline Management System

Design: (details of design--or links to such--user interface features, internal implementation)

Milestones: (significant delivery/evaluation points used when relevant)

Subtasks: (smaller segments made visible for more detailed planning purposes as needed)

SubContracts: (other tasks initiated in direct support)

We will keep some or all of the Baseline Record within a specially organized subcollection of the Journal, shelved separately, and we will use as a "Shelf List" a topically organized Table of Contents. Sections of the Baseline Record that are superseded by new Journal entries will be retired to obsolete status. Changes will be approved and recorded as in configuration management of hardware designs.

We are developing new tools to aid analysis of estimates, schedules, and staff involvements, with interactive factor adjustment features to permit consideration of the effects of potential changes in configurations of dates, people, and interdependent tasks.

<JOURNAL>7410.NLS;1, 18-OCT-71 8:18 JCN ; Title: Author(s): MFA WLB RDB MSC WSD DCE BAH MEH FPH JDH CHI MEJ HGL JTM JBN JCN CXP BLP WHP JCP JR BER EKV DVN KEV DCW RWW DIA JAF;, James C. Norton/SRI-ARC JCN; Distribution: James C. Norton/JCN; Sub-Collections: NIC; Clerk: JCN; Origin: <DOCUMENTATION>J7410.NLS;1, 15-OCT-71 17:02 JCN ;

APPENDIX G: Collaborative System-Evolution System

APPENDIX G: Collaborative System-Evolution System

Introduction

A fully developed augmentation system of a few years hence will have a very large repertoire of commands, representing a rich vocabulary for eliciting help from the computer system. To experiment meaningfully with any one subset of commands, designed to support a special kind of intellectual task, the evaluation must rightfully be done within a working environment in which the subjects are doing all of their associated work in the way they would do it in the "complete workshop."

This means that to provide a progressive research environment in which rapid and significant evolution can take place, some sort of a "latest thing in complete workshops" must be maintained as a laboratory for each experimenter. To maintain this in separate installations is quite impractical.

The computer network offers an important hope here, in that it makes it possible for people at distributed locations to share a "latest thing in complete workshops" as an environment for their different, specific "tool-development experiments."

For several years ARC has been aiming toward an experimental future where this was the way in which our work on augmentation systems would be done--as part of a larger community in which many more people than we could marshal would be working on different fronts (and at different levels).

For instance, much of our motivation toward the Dialog Support System has been to facilitate close collaboration between such distributed system-development participants.

Besides being able to sustain collaborative dialog, the participants would be much helped if each could view a relatively stable system as the background in which he experimented with a new tool, and if he could very rapidly and independently create and modify new tool features.

Our launching of a Modular Programming System was done explicitly to serve this end. When NLS has been modularized, it will be possible for instance to permit a worker at Utah to be given "custodianship" of a private subset of modules pertaining to the manipulation of one kind of graphic-data packet in our file data nodes.

He would be given his private copies of the source-code files for these modules, and could add and/or modify them at will. His modules can be independently compiled by him at any time; and when he wishes to experiment with the resulting "new tool," his compiled modules can be linked into the rest of the NLS compiled-code module set at run time, perhaps in place of some modules that the standard version of NLS offers but that he is redoing.

To experiment with his tool, he can use it in the midst of processes, methods, and information that are part of a busy (and evolving) working life in the whole workshop.

Each person can do his private development with minimal burden on the support system, and with maximal protection to the other workshop users.

The standard-NLS Module Set would be controlled and updated by a central community process, steadily integrating the improvements of the trial tools as they become thoroughly checked out.

General Notes about the Modular Programming System

What We Are Looking For From MPS

(1) Improved design--modularity

Control structures that encourage modular design

runtime entities, called processes, correspond to modules

control is passed among the processes

Control structures that encourage simple interfaces

processes communicate by messages sent over "ports"

(2) Improved debugging

Source language debugging

Integrated with NLS

(3) Ease of modifications

Incremental compilation

Dynamic linking and symbolic references

Change single module rather than reloading entire system

(4) Ease of development

Make new configuration of existing modules rather than reprogram

Library of modules--such as hardware components

Software components--modules of high generality

(5) Address space considerations

Modules relocatable in address space

Mapped in only as needed, not loaded otherwise

Dynamically establish and modify configuration

(6) Flexiblity--from "virtuality" of external references

Modules communicate via ports

May connect any other module to the port

May replace any module by another that satisfies the interface requirements

Connection of ports binds the "virtual facilities" of the module to real facilities

The formation of these connections (and thus the binding of facilities for the module) is not only delayed until run time but may even be changed as the module runs

(7) Reliability

Simpler relationships and dependencies

Better definitions of interfaces

Ability to put a module into a test environment for verification

(8) Ability to interface special purpose "subsystems" to NLS

May interface modules responsible for NLS file handling, display generation, etc. to new modules to make special subsystems of NLS

(9) Transportability

Language for MPS and the system primitives should be relatively easy to move to other machines

Very few primitives written for the base machine

Most of MPS written as modules by bootstrapping

A restricted MPS for the NOVA minicomputer has already been partially designed

(10) Ability to access remote systems

Can build module that will run with NLS and drive another system over the Net

May interact with NLS user, format request, send over Net, get response, format for insertion into NLS file or for NLS display

(11) Ability to move modules to other computers

Such as interactive parts of NLS

Communicate through Net

(12) Collaboration with other groups on software development

Well-defined interfaces, dynamic loading, modularity make it possible for other groups to build modules to run with NLS

This obviously will be combined with ability to have modules communicating over the Net

Why We Think It Will Work

The modularity/process/port/virtuality ideas have been successfully used by Rudy Krutar in several systems, including a parser for an interactive extendable programming system.

APPENDIX G: Collaborative System-Evolution System

Somewhat more grandiose schemes have been considered by Bob Balzer and others at Rand.

The segmentation/compilation/debugging ideas have been worked out by Peter Deutsch and company and at least partially tried out in SPL for the BCC machine or various LISP implementations.

Peter Deutsch and Jim Mitchell have been involved with the design and implementation of the system. In addition, Butler Lampson and Alan Kay may contribute to the design.

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