

XEROX

INFORMATION PRODUCTS GROUP

System Development Division

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DRAFT - DRAFT - DRAFT

To: file

From: W. C. Lynch

Location: Palo Alto

Subject: Preliminary Pilot Development Work Plan

Keywords: Pilot, work plan

File: <Lynch>PilotWp.Memo or <Lynch>PilotWp.Ears

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XEROX SDD ARCHIVES
I have read and understood
Pages _____ To _____
Reviewer _____ Date _____
of Pages _____ Ref. 77SDD-326

Introduction

This workplan presents the plan for the creation and delivery of Pilot, in detail, through release 2.0 on May 31, 1978. This release will both be the first release for the D0 and contain the function required for the Janus IMO release. This workplan does not cover the period beyond the release of Pilot 2.0 in nearly as much detail. Pilot 2.0 will provide almost all of the functions called for in the *Pilot Functional Specifications* but will not necessarily have either the performance or the main memory consumption required for product release.

Common Software (anything not covered in the Pilot Functional Specs) is not covered by this workplan. System integration activities (post release support, performance improvements, and memory requirement reductions) beyond the release of Pilot 2.0 are not broken down into detail.

Very little in the way of post release support for Pilot 1.0 (Pilot on the Alto) is contemplated and the mechanisms for post release support of system software products in general have not yet been worked out. When they are, additional tasks will undoubtedly be identified.

OIS Mesa, as represented by the *OIS Mesa Functional Specification*, will disappear as an identifiable project, as will that document. The functions represented are being divided between the Pilot project and the Mesa project and the portion subsumed by Pilot is covered by this workplan. The remainder of the functions are to be covered by the Mesa workplans.

Background data

productivity assumptions - document preparation

This section will list the productivity assumptions upon which this workplan is based. The background material that was used to arrive at these assumptions is contained in <Lynch>Productivity.memo. It is the intention in this project to track the actual productivity rates achieved, both to enlarge our data base of productivity information and to give early warning of potential schedule deviations.

The construction of written documentation is a very significant component of this project. We therefore need an estimate of the productivity of producing this documentation. I estimate a production rate of 4 pages/day if the material is already thought out and no background documents are required (RawPage). Otherwise the rate is .5 pages/day (FinishedPage). The thinking through of the material seems to require 3 SupportPages per FinishedPage. Each SupportPage is treated as a RawPage

Each RawPage requires .67 hours of Alto usage (AltoHour). We therefore estimate 4.5 AltoHours/FinishedPage. Alto usage for document construction will be based on this figure.

document size distribution

In order to estimate the effort required to produce the necessary documents, we need to estimate the size of the documents. To this end I estimate that

The design spec is three times the size of the functional spec

The test spec is 12 pages

The technical documentation is twice the size of the functional spec

productivity of coding and unit test

Again from <Lynch>Productivity.memo we estimate that our programmers will code and unit test 800 lines of Mesa source code (*loc*) per man month (*mm.*). at the well established conversion figure of 2.5 bytes of object code per loc we obtain a productivity of 2000 bytes/mm. These figures are also consistent with the estimate given in the *SDD Software Development Procedures and Standards (P+S)* which claims that coding and unit test represent 15% of the total effort and that each person will produce about 1500 loc per man year overall.

From the data presented in Productivity.memo I estimate that 0.16 AltoHours per loc are required and this plan is based on that figure.

Alto usage is not likely to be more than 50% effective. I will therefore assume that one Alto will yeild 100 hrs. of usage per month.

program size distribution

In order to estimate the programming effort we need to estimate the size of the individual programs. Information of this sort is contained in <Lynch>PilotSizes.Memo. That document estimated the number of locs per procedure and turns that into a number of bytes generated. By doing a regression on the number of procedures per chapter of the *Pilot Functional Specification* we obtain a figure of one thousand bytes of code for every three pages of *Pilot Functional Specification*, deleting first the introductory chapter and appendices and the first introductory 1.5 pages of each chapter.

phase distribution

We are already part way through the Pilot project. I estimate thjat we are 70-75% through the definition phase. Of the remaining effort, the P+S indicates that we will have

- 10% in the definition phase
- 22.5% in the design phase
- 22.5% in the code and unit test phase
- 45% in the system test phase

The system test phase will commence with the release of Pilot 2.0. All other phases will be completed before the release of Pilot 2.0.

Alto/Pilot - Pilot 1.0 (Internal release only)

references

Memo of May 19, 1977 from D. DeSantis to Bill Lynch - subject: Desired Alto-based Pilot Functions

Memo of June 2, 1977 from J. Szelong to W. Lynch - subject: Alto/Pilot

documents

Alto/Pilot Functional Spec - Small document to point to relevant parts of the Pilot FS - to be constructed from Pilot Functional Specification 2.0

Alto/Pilot Design Spec - unreleased memo to be constructed from the Pilot design spec.

Alto/Pilot Test Spec - memo plan due 15 September 1977

Alto/Pilot Tech Doc - none

Standard release Description

Post release support (bug reports) TBD

D0 Conversion

An important dependency in this workplan is the reliance on the existence of a reasonable programming environment on the D0. The attainment of this situation has come to be known as the D0 conversion problem. The current plan is to achieve the D0 programming environment in a stepwise fashion. The crucial point is to create a set of microcode which will cause the D0 to emulate the Alto. The Mesa debugger will be constructed in such a fashion that the debugger itself will execute in the well debugged Alto world while debugging code operating in the D0 princeps world. The microcode will be swapped upon entering and leaving the Mesa debugger.

With these facilities, D0 programs can be debugged with the full power of the Mesa system available and without regard to how much or how little of the D0 system is working. This dual world system with the two sets of microcode will be released with Pilot 2.0 so that Applications can also enjoy the benefits of a reliable mesa debugger in their initial D0 efforts.

[Say something about how the critical I/O devices will be debugged and integrated into Pilot. The file system

will begin with a simulated disk really in main memory, followed by the integration of the real Pilot disk drivers. This decouples the debugging of the Pilot disk drivers from the development of the rest of Pilot.]

references

Memo dated June 6, 1977 from Wendell Shultz to distribution. subject: Conversion plan to D(0)

<Johnsson>Conversion27Jun.bravo

see <Lynch>D0Conversion.Memo

Documents

name	prsn ¹	date	size	effort	Alto time
D15 - Project document List	L	7/30/77	2 pages	.2 mm.	9 hrs.
D12 - Preliminary Work Plan	L	8/15/77	8 pages	1 mm.	36 hrs.
D2 - Pilot Functional Specifications	U	8/30/77	75 pages	4 mm.	340 hrs.
D13 - Design Work Plan	L	9/15/77	10 pages	1 mm.	40 hrs.
D18 - Alto/Pilot Test Spec	L	9/15/77	4 pages	1 mw.	9 hrs.
D16 - Alto/Pilot Functional Spec	T	10/1/77	8 pages	1 mw.	9 hrs.
D3 - Pilot Design Specifications	R(GHUTO)	11/1/77	225 pages	12 mm.	1000 hrs.
D14 - Implementation Work Plan	L	11/15/77	10 pages	1 mm.	40 hrs.
D17 - Alto/Pilot Design Spec	R	11/30/77	24 pages	3 mw.	36 hrs.
D1 - Pilot Concepts and Facilities	U	11/30/77	40 pages	1 mm.	60 hrs.
D11 - Pilot test Plan	L	12/1/77	8 pages	.5 mm.	36 hrs.
D19 - Alto/Pilot Standard Release Description	U	12/15/77	2 pages	1 mw.	9 hrs.
D6 - Pilot Test Specs	T	5/1/78	8 pages	1 mm.	36 hrs.
D7 - Std Release Descriptions (2.0)	L	5/31/78	2 pages	1 mw.	9 hrs.
D8 - Std Release Descriptions (2.1)	L	8/31/78	2 pages	1 mw.	9 hrs.
D9 - Std Release Descriptions (3.0)	L	12/31/78	2 pages	1 mw.	9 hrs.
D4 - Pilot Tech Manual		11/1/79	150 pages	4 mm.	225 hrs.
totals			580 pages	27.95 mm.	1912 hrs.

Programming Projects

project name	prsn¹	date req	size²	effort	Alto time
P3 - Pilot 1.0 Memory mgmt.	G	9/77	1440	2 mm.	230 hrs
P4 - Pilot 1.0 file system	T	10/77	2640	3 mm.	420 hrs
P1 - Alto emulator microcode	J	10/77	1000	2 mm.	230 hrs
P2 - Nova emulator microcode	J	11/77	300	1 mm.	115 hrs
Alto/Pilot post release support					
P5 - Pilot 2.0 Memory mgmt.	R	1/78	1440	1 mm.	115 hrs
P8 - Pilot 2.0 configuration Install ³	J	1/78	2000	2 mm.	230 hrs
P7 - Pilot 2.0 process structure	U	2/78	2160	2 mm.	230 hrs
P11 - Pilot 2.0 Mesa mods - trap handlers	W	2/78	1000	3 mm.	420 hrs
P6 - Pilot 2.0 file system	R	3/78	2640	2 mm.	230 hrs
P9 - Integrate 2.0 communications ³	U	3/78	n.a.	1 mm.	115 hrs
P10 - Integrate 2.0 I/O devices ³	U	4/78	n.a.	1 mm.	115 hrs
P12 - Pilot 2.0 Virtual memory handler	JR	4/78	2000	3 mm.	420 hrs
P13 - Pilot 2.0 Release construction	J	5/78	n.a.	1 mm.	300 hrs.
P16 - Integrate 3.0 device handlers ³	U	6/78	n.a.	1 mm.	115 hrs.
P14 - Pilot 2.1 Release construction	J	8/78	n.a.	1 mm.	300 hrs.
P19 - Integrate 3.0 communications system ³	U	8/78	n.a.	1 mm.	115 hrs.
P20 - Pilot 3.0 Release construction	J	12/78	n.a.	1 mm.	300 hrs.
P15 - Pilot 4.0 swapping over Xerox Wire		6/79	1000	1 mm.	140 hrs.
P17 - Pilot 4.0 multiple MDS support		6/79	300	.5mm.	60 hrs.
P18 - Pilot 4.0 Janus B support		6/79			
totals			16620 pages	34 mm.	4200 hrs.

notes

- 1 G - Dave Gifford
H - Tom Horsley
J - Rich Johnsson

- L - Bill Lynch
- R - Dave Redell
- T - To be announced
- U - Hugh Lauer
- W - John Wick

- 2 - All numbers are in lines of Mesa code (loc) except the microcode tasks which are in lines of microcode.
- 3 - Assumes the assistance of the supplying organization.

Systems Integration and Support

project name	prsn ¹ date req	size ²	effort	Alto time
S1 - Everything	6/79		35mm.	4025 hrs.
totals		pages	35 mm.	4025 hrs.

Overhead activities

Vacations

Group management

Productivity tracking

Xerox University Affairs Committee

Schedules

1977

	J	A	S	O	N	D
Gifford	D3	<u>P3</u>	-	<u>1/4</u>	-	<u>time</u>
Horsley	<u>na.</u>	-	<u>D3</u>	-		
Johnsson	<u>na.</u>	-	<u>P1</u>	-	P2	<u>P8</u> -
Lauer	<u>D2</u>	-	<u>D3</u>	-	D1	D19
Lynch	D12-D15					
			D13	D18	D14	D11
Redell	D2	<u>D3-</u>	-	-	-	D17
TBA (McJones)	P4	<u>D3</u>	-	<u>D16</u>	-	
Wick	<u>na.</u>	-	-	-	-	P11
Overload		<u>D3</u>	-	-	-	
<i>Alto hours</i>	294	461	580	627	211	320

	1978												
	J	F	M	A	M	J	J	A	S	O	N	D	
Gifford	<u>1/4 - time</u>				-	-	-	-	<u>1/4 - time</u>				-
Horsley												D4	
Johnsson	- P8	<u>P12</u>		-	P13				P14				P20
Lauer	<u>P7</u>	-	P9	P10	D1	P16				P19			
Lynch					D7				D8				D9
Redell	P5	<u>P6</u>	-	P12				<u>D4</u>	-	-	-	-	
TBA				D6									
Wick	<u>P11</u>	-	na.	-	-	-	-	-	-	-	-	-	
<i>Alto hours</i>	485	370	370	311	369	115	0	499	75	0	0	309	

Special Hardware

One extra model 31 disk drive and controller - Jan - June 78

One extra memory board - Jan 78 to Jan 79

Dependencies

D0 delivery and acceptance - *by February 1, 1978*

Rigid disk and control - *dual model 31's*

D0 ethernet

Alto compatible keyboard, mouse, and display for initial debugging

D0 Alto environment

Debugger - *Cross debugger released by February 1, 1978*

Tools - *Installed and operational by Nov 15, 1977*

Program librarian - *Installed and operational by Nov 15, 1977*

IFS - *SD Palo Alto system installed and operational by Nov 15, 1977*

D0 Mesa Princeps environment - *Available by April 15, 1978*

Wick availability - *how much?*

Mesa features

Process structure - *August 31, 1978*

D0 compiler - *January 15, 1978*

Global frame size reduction - *August 31, 1978*

Default parameters in D0/Mesa concurrent with Pilot 2.0

Unresolved Issues

How is the microcode to be banked - dynamically changeable, loaded, started

How is distribution and support to be carried out after release? Will there be an SDD library as described in the *SDD Software Development Procedures and Standards*? What will the DCN procedure be? How does all fo this relate to policy #606, whatever that says?

Releases

Alto/Pilot - Pilot 1.0 - Dec. 15, 1977

Pilot 2.0 - May 31, 1978

Pilot 2.1 - August 31, 1978

Pilot 3.0 - Dec. 31, 1978

This is IT, the Janus 1 release Pilot

Pilot 3.1 - March 31, 1979

Pilot 3.2 - June 30, 1979

Pilot 4.0 - Sept. 31, 1979

Reviews

Pilot Functional Specifications September 15, 1977

Pilot Design Specifications November 15, 1977

Pilot Test Specifications January 15, 1977

Pilot Release Plan September 15, 1979

Milestones

All reviews and all releases

Schedule

Code + Unit test Jan 15 - May 15

7000 loc + 3000 loc from Pilot 1.0

3 programmers full time

Distribution:

Lynch