

SANDIA REPORT

SAND98-0341 • UC-705

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Printed February 1998

Department 1824 Job Card System: A New Web-Based Business Tool

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Prepared by
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Department 1824 Job Card System: A New Web-based Business Tool

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Abstract

The Analytical Chemistry Department uses a system of job cards to control and monitor the work through the organization. In the past, many different systems have been developed to allow each laboratory to monitor their individual work and report data. Unfortunately, these systems were separate and unique which caused difficulty in ascertaining any overall picture of the Department's workload.

To overcome these shortcomings, a new Job Card System was developed in Lotus Notes/Domino™ for tracking the work through the laboratory. This application is groupware/database software and is located on the Sandia Intranet which allows users of any type of computer running a network browser to access the system. Security is provided through the use of logons and passwords for users who must add and/or modify information on the system. Customers may view the jobs in process by entering the system as an anonymous user. An overall view of the work in the department can be obtained by selecting from a variety of on screen reports. This enables the analysts, customers, customer contacts, and the Department Manager to quickly evaluate the work in process, the resources required, and the availability of equipment. On-line approval of the work and e-mail messaging of completed jobs has been provided to streamline the review and approval cycle.

This paper provides a guide for the use of the Job Card System and information on maintenance of the system.

Acknowledgments

The author wishes to acknowledge the work of Jeff Cummings of Webco Inc., Albuquerque, NM, for providing the first Web-based prototype system, Eli Harris and Guruka Singh Khalsa of Sun and Son, Santa Fe, NM, for their work in writing the Lotus Notes-based Job Card System in such a short time, and Tom Beller for his help in installing the Domino Server software.

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Department 1824 Job Card System: A New Web-based Business Tool

Introduction

The Analytical Chemistry Department utilizes a Job Card System for tracking work within the organization. The original system was completely paper based and involved extensive filing and maintenance. With the availability of desktop computers and small laboratory networks, individual laboratories worked to modify this paper system to better meet their individual needs. This resulted in many different and unique systems based upon the way each laboratory worked.

One of the major problems with the paper system was that often the services from several laboratories were needed to obtain a complete set of results for a customer. This led to the need to create several job cards (one for each laboratory) which had to be combined to give the customer the information he desired. This distribution of work resulted in: excessive and redundant paperwork, difficulty in keeping related work correlated, and inconsistent approvals of the work being performed. Furthermore, management suffered greatly with the difficulty in: understanding their department's workload, retrieving information about samples and case number charging, and the bulky process of archiving large volumes of paper records. Clearly, one consistent system was needed to address these issues.

In 1995, the Sandia Intranet became a popular tool for providing information to all employees, and applications for this new tool were beginning to be developed. The Intranet has the ability to be accessible across Sandia from any desktop computer running a web browser such as Netscape or Microsoft's Internet Explorer. Unfortunately, robust tools for dynamically working with the intranet and HyperText Markup Language (HTML) code were not readily available and were cumbersome.

In order to take advantage of the Sandia Intranet, it was decided to develop a web-based Job Card System. Webco was contacted to develop this "proof of concept" system in late 1995. The original system was developed to track the work through the department, providing minimal information about the work. Initial acceptance of this system and the foreseeable utility of a fully implemented system, lead to the development of the current Job Card System.

In an effort to have a system that was robust, flexible, expandible, and easy to maintain and use, several Web tools were reviewed. A number of needs were immediately identified: the system must be able to e-mail information to alert contacts, managers, and customers of the status of the work, the database must be able to accept file attachments which will become part of the job card, and the system must be compatible with current databases (Open Database Connectivity (ODBC) compatibility). Only Lotus Notes/Domino software met all of these requirements.

Users Guide

The users guide is intended to help the user understand what he needs to know to perform his job using the Job Card System. It describes the individuals who take part in using the job card, the parts of the job card, the laboratory document, how to create and edit these documents, and how to approve them. A guide for the administration of the job card system is presented later in this manuscript to assist those needing more detailed information on maintaining the system. It is not expected that the general user will need this detailed information but it has been consolidated into this document should the need arise.

The Users of the Job Card - Roles and Responsibilities

There are several important roles to understand with the new Job Card System. These are: the customer, the contact, the analyst, the manager, and the system administrator. While several of these may be the same person, an understanding of what each does is important.

The customer is the most obvious. He is the one who has the problem to solve. He is also the one who will provide the funding, via a case number, with which the work can be accomplished.

The contact is the person who will interface with the customer to make sure that his problem is solved and with the best answer. The contact is responsible for: entering the job card, creating the laboratory documents (a.k.a. lab docs), distributing the work to the analysts, collating the completed work, tracking and reviewing the work, updating the customer on the status, and distributing the completed job card to the customer. The contact is the key player in satisfying the customer and making sure that the right work is being performed to accurately address the problem and providing preliminary approval of the results.

The analyst is the person who performs the work required to address the customer's problem. Sometimes only part of the problem will be addressed by the results of the analyst. This is why the contact is so important. The analyst should address any concerns about the work to the contact for clarification or, if need be, with the customer. However, it is expected that the contact will have a clear understanding of the problem such that he will be able to address any concerns, answer analysts questions, and review the data for accuracy and validity. Following the completion of the assigned work, the analyst will fill in the results on the lab doc.

The manager is responsible for the final approval of all of the work performed for the customer. Following a review by the contact, the manager will interface with the contact on questions concerning the work. Since the manager is responsible for the overall performance of his department, his approval indicates acceptability of the work.

Finally, the system administrator is responsible for the overall functioning of the Job Card System. While he is not responsible for the content of the job cards, he assures that the system is operational, that appropriate access is given as needed, and that problems with the system are resolved.

Figure 1 shows how a job card is created and flows through the laboratory. The different roles are apparent in this diagram, which should clarify the entire process. Exceptions to this flow occur when additional work is required to satisfy the customer or clarify questionable results prior to the issuance of the final, approved job card.

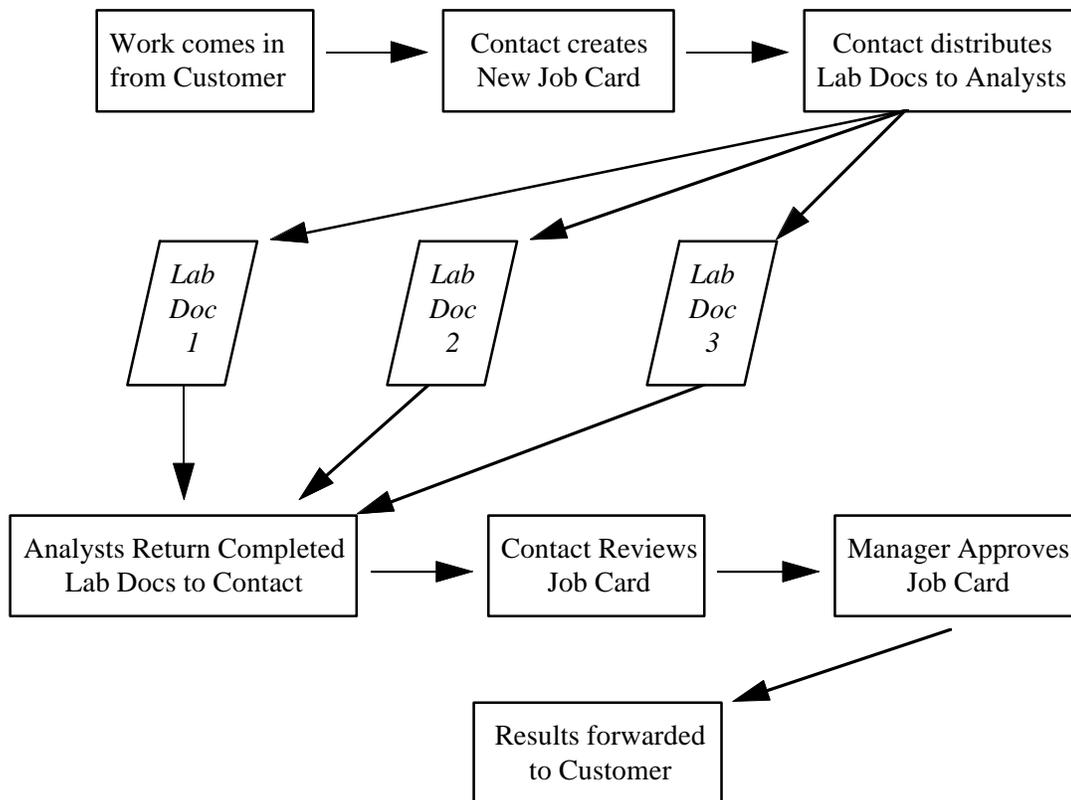


Figure 1. Flow Diagram for a Job Card / Lab Docs using New Job Card System

The Parts of the Job Card

The original paper job card had several sections: a header, safety information, sample description and history, the work requested, results/data, and management approval. However, on many samples, several laboratories were required to perform specific but different work on a sample. Given this, major sections of the job card would need to be repeated for each lab while different work instructions were needed.

The New Job Card

To resolve the problem of several laboratories using the same job card, and combining the work and results into a unified report format for the customer, the sections of the paper job card were divided into those that were general to all laboratories and those that were specific to individual laboratories. The general sections, now referred to as the “job card” contain: The header, safety information, sample description/history and approvals.

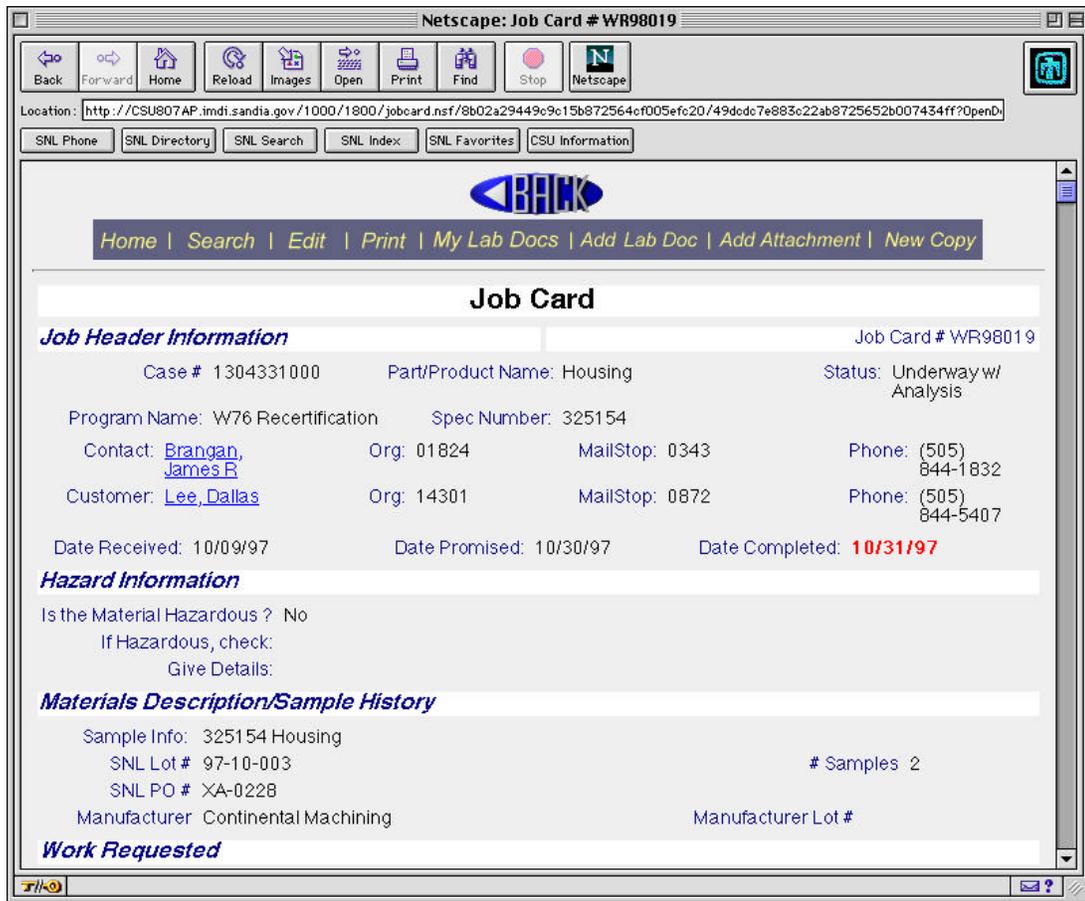


Figure 2. View of Job Card form showing header, hazard information, and sample description. (Note: This job card is of the “Incoming” type containing lot information in the sample description area).

It was also known that the production customers required specific items in a sample description which were not needed by other customers. This necessitated two types of job cards; “incoming” and “narrative”. The “incoming” job card has a sample description that contains lot number and vendor information. It also causes the lab doc (described below) to use a line-item format for analysis, expecting sequence or specification numbers for each analytical requirement. The “narrative” job card provides a free-form space which allows for a lengthy description of the sample. This also spawns a free-form lab doc. A combination of these two is offered with the option of “both” when selecting the job card type.

The Lab Doc

The concept of a lab doc (short for laboratory document) was invented to allow a single job card to be distributed among several labs, giving unique instructions to each. This document gives work instructions to a single laboratory and is assigned to a single analyst. Along with the instructions, space is provided for the results, a completed date, and hours worked. This allows laboratories that complete the work to close out their part, while other labs can still be working. It further permits the analysts to see exactly what work they need to do and helps them prioritize it by date due.

The screenshot shows a Netscape browser window titled "Netscape: LabDoc # WR98019EXF". The address bar contains the URL: <http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/LabDocLookup/135B578F03CB6A9C8725652B0074970D?OpenDocument>. The browser interface includes standard navigation buttons (Back, Forward, Home, Reload, Images, Open, Print, Find, Stop) and a search bar. Below the browser window, the Lab Doc page is displayed with a navigation menu: [Home](#) | [Search](#) | [Edit](#) | [Print](#) | [My Lab Docs](#) | [View Job Card](#) | [Add Attachment](#). The main content area is titled "Lab Document" and contains the following information:

Lab Doc Information Lab Doc # WR98019EXF

Job Card # WR98019
 Date Received: 10/09/97
 Date Renegotiated:

Part/Product Name: Housing
 Original Date Promised: 10/30/97
 New Date Promised: 10/30/97
 Date Completed: 10/17/97

[Click here to go to the Job Card](#) ----- >

Analyst

Analyst: [Brangan, James R](#) Org: 01824 MailStop: 0343 Phone: (505) 844-1832

Work Requested

Sequence Number	Work Requested
1.5010	1.Magnesium = 0.8% - 1.2%
2.5010	2.Silicon = 0.4% - 0.8%
3.5010	3.Copper = 0.15% - 0.40%
4.5010	4.Chromium = 0.04% - 0.35%
5.5010	5.Iron = 0.7% Maximum

Results Total Hours 2

Sequence #	# of Tests	# Failed	Pass/Fail	Results
1.5010	2	0	Pass	Magnesium = 1.1%, 1.2%
2.5010	2	0	Pass	Silicon = 0.6%, 0.6%
3.5010	2	0	Pass	Copper = 0.31%, 0.31%
4.5010	2	0	Pass	Chromium = 0.18%, 0.17%
5.5010	2	0	Pass	Iron = 0.4%, 0.4%

Figure 3. Laboratory Document (Lab Doc) of a sample with work requested and results. (Note: This lab doc is of the “Incoming” type containing tabulated work requested and results).

The Main Menu

The main menu (Figure 4) of the Job Card System is used primarily for access control to the system. Analysts, contacts, and administrators are given usernames and passwords to allow them to modify the system. All others (customers) may enter the system to view only select jobs.



Figure 4. Main Screen of 1824 Job Card System.

Analysts, contacts and administrators log on to the system by pressing the “Login to JC System” link. This brings up the login screen (Figure 5). Customers may enter the system as an anonymous user by pressing on the spinning “enter” link. While the customer will be able to view certain job cards, they will not be allowed to add or modify them. Attempting to do so will bring up the login screen to authenticate the user as an analyst, contact, or administrator.

Enter username for /1000 at
CSU807AP.imdi.sandia.gov:

Name:

Password:

Cancel OK

Figure 5. Login screen for analysts, contacts, and administrators.

Creating a New Job Card and Lab Doc

Once in the system, the user is presented with a view of their current laboratory documents (Figure 6) that are requiring work. Job cards may be created, viewed, and approved from this screen.

New job cards are created by clicking on the "Create New Job Card" link from any of these job card views or by copying an already existing job card (See Copying a Job Card later in this section).

The screenshot shows a Netscape browser window titled "Netscape: My+Lab+Docs". The address bar contains the URL: <http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/My+Lab+Docs?OpenView&Login>. Below the address bar are several navigation buttons: Back, Forward, Home, Reload, Images, Open, Print, Find, Stop, and Netscape. There are also buttons for SNL Phone, SNL Directory, SNL Search, SNL Index, SNL Favorites, and CSU Information.

The main content area features the Sandia National Laboratories logo and the title "My Lab Docs". Below this are several links: [Create New Job Card](#), [Review and Approval](#), [Previous](#), [Next](#), [Expand](#), [Collapse](#), and [Search](#).

Under the heading "Job Cards", there are several sub-links: [By Contact](#), [By Job Card #](#), [By Program Name](#), [By Customer](#), [Recent](#), [Public](#), [Completed](#), [My Drafts](#), and [My Job Cards](#). Below these is the heading "Lab Docs" with a sub-link [By Analyst](#).

A table displays the following data:

Part Name	Lab Doc #	Date Promised
Contaminants	XRF98004IR	11/10/97
Cu/Au Braze Material	XRF98003EXF	11/06/97
Mn:Ti Quazimetallize	WR97243MISC	09/29/97

Figure 6. First view upon logging into the Job Card System.

After clicking on the "Create New Job Card" link, the user will be sent to a form where they must select a prefix, and the type of job card to be created (Figure 7).

The screenshot shows a Netscape browser window with the title "Netscape: 98b03c5cac9e3464872564bf0062c18". The address bar contains the URL "http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/98b03c5cac9e3464872564bf0062c189?OpenForm". Below the address bar are several navigation buttons: Back, Forward, Home, Reload, Images, Open, Print, Find, Stop, and Netscape. A row of utility buttons includes SNL Phone, SNL Directory, SNL Search, SNL Index, SNL Favorites, and CSU Information. The main content area has a heading "Choose Job Card Prefix and Job Card Type". Below this heading, there is a "Job Card Prefix:" label followed by a text input field containing "WR". Underneath is a "Job Card Type:" label followed by three radio buttons: "Incoming" (which is selected), "Narrative", and "Both". At the bottom center of the form is a button labeled "Create New Job Card".

Figure 7. The “Create New Job Card” form, permitting selection of the job card prefix and type.

The types of job cards that can be created can be described as follows:

Incoming - this applies to WR (War Reserve) work where specific tabulated tests are being requested. The tabulation (often referred to as a sequence number) is provided, along with the pass/fail criteria. The description on this job card consists of a short, free-form line of text, a Sandia Lot number, a Sandia Purchase Order number, the manufacturer's name and the manufacturer's lot number.

Narrative - this applies to standard laboratory work, where large, free-flow boxes are provided for the sample description and history, work requested, and results. The narrative boxes permit an unlimited length of text to be entered.

Both - this is a hybrid job card where the specific sample and testing information provided on the "Incoming" job card is combined with the large, free-flow boxes of the "Narrative" job card.

Once the selection of the job card type and prefix have been made, clicking the "Create New Job Card" button creates the next job card in the sequence. Job card numbers are a combination of: the prefix, fiscal year, and sequential number.

ie. LAB98010 - would be the 10th job card in FY98 for the prefix "LAB"

Each prefix is assigned it's own numbering system and is typically used to designate the laboratory into which the work arrived (not necessarily where it will end up).

The Job Card Form

Once the job card number has been generated, the next step is to fill out the remainder of the job card. This is accomplished by tabbing and clicking through the job card form (Figure 8) and filling in the blank spaces. "Contacts" and "Customers" are selected from pull down menus which are maintained by the system administrator. Should the correct name not appear on the menu, another may be temporarily substituted until the name has been added to the menu (see System Administration Section).

The screenshot shows a Netscape browser window titled "Netscape: Job Card # WR97241". The address bar contains a long URL. Below the browser window, the "Job Card" form is displayed. The form has a header with navigation links: "Home | Search | Edit | Print | My Lab Docs | Add Lab Doc | Add Attachment | New Copy". The main content area is titled "Job Card" and contains the following sections:

- Job Header Information**: Job Card # WR97241. Fields include Case # (3546200000), Part/Product Name (Lithiated Catholyte), Status (Underway w/ Analysis), Program Name (Thermal Battery), Spec Number (33382943), Contact (Brangan, James R), Customer (Moya, Larry), Date Received (09/18/97), Date Promised (10/01/97), and Date Completed.
- Hazard Information**: "Is the Material Hazardous?" (Yes selected). Checkboxes for "Radioactive", "Explosive", "Skin/Eye Irritant", "Carcinogen", "Corrosive", "Flammable/Combustible", "Pyrophoric", and "Toxic".
- Materials Description/Sample History**: Sample Info (33382943 Unused Lithiated Catholyte), SNL Lot #, SNL PO #, Manufacturer, and Manufacturer Lot #.

Figure 8. Job Card form open in edit mode to allow for entry of header, hazard, and sample information.

When the job card has been filled out (excluding the "Work Requested" and "Results"), click on the "Submit" button at the bottom of the screen. This will take the user to the "Add Lab Doc" screen.

Adding a Lab Doc

When entering a lab doc (Figure 9), the user will be allowed to select which instrument or technique will be used to analyze the sample. A pull down menu is used for this, and the type of lab doc is displayed for the user's convenience. Once the correct technique has been selected, click on the "Create New Lab Doc" button to create the document where the work requests and results will reside.

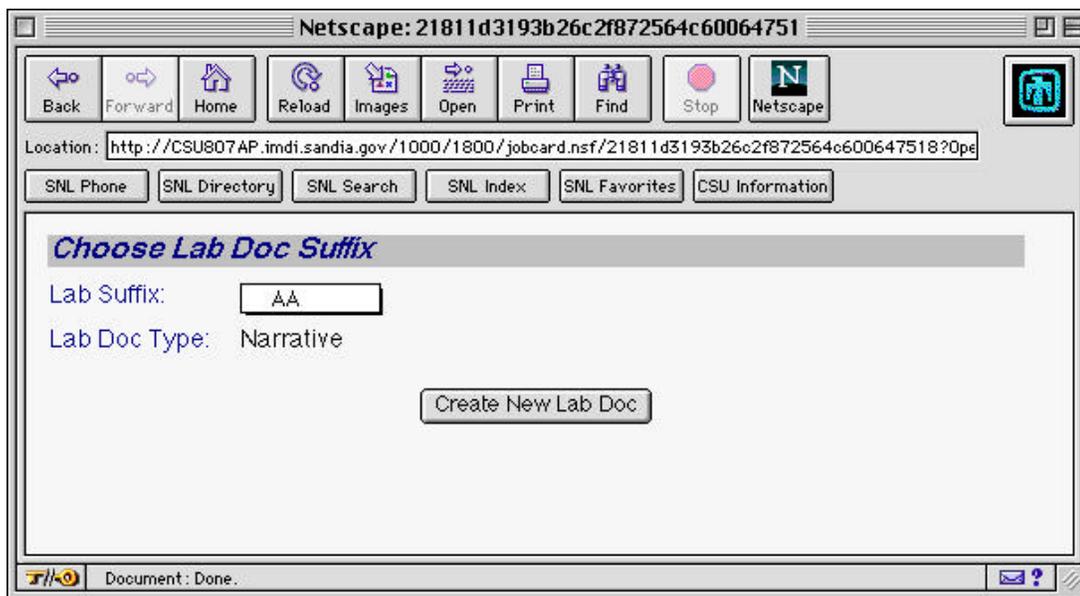


Figure 9. The "Add Lab Doc" form, permitting selection of the lab doc suffix.

The Lab Doc Form

This form is similar to the job card form in that the user tabs and clicks through the fields and enters the information in the spaces provided (Figure 10). The analyst assigned the work is selected from the pull down menu (note: this is the same menu as the contact menu on the job card form). In this way, one person is responsible for each specific piece of work.

The screenshot shows a Netscape browser window titled "Netscape: LabDoc # WR97241ICP". The address bar contains the URL: <http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/6ea21f19e3870ee8872564d7005bb9fa/1513e4485e727de187256522006ff20d?Ed>. The browser toolbar includes buttons for Back, Forward, Home, Reload, Images, Open, Print, Find, Stop, and Netscape. Below the toolbar are buttons for SNL Phone, SNL Directory, SNL Search, SNL Index, SNL Favorites, and CSU Information.

The main content area features a navigation bar with a "BACK" button and links for Home, Search, Edit, Print, My Lab Docs, View Job Card, and Add Attachment. The title "Lab Document" is centered above the form.

Lab Doc Information

Lab Doc # WR97241ICP

Job Card # WR97241
 Date Received: 09/18/97
 Date Renegotiated:

Part/Product Name: Lithiated Catholyte
 Original Date Promised: 10/01/97
 New Date Promised:
 Date Completed:

Click here to go to the Job Card ----->

Analyst

Analyst: Org: 01824 MailStop: 0343 Phone: (505) 844-6450

Work Requested

Sequence Number	Work Requested
1. <input type="text" value="6.1.1"/>	1. <input type="text" value="Total Iron & Sulfur = 73% +/- 3%"/>
2. <input type="text" value="6.1.2"/>	2. <input type="text" value="Magnesium = 5.20% +/- 0.50%"/>
3. <input type="text"/>	3. <input type="text"/>
4. <input type="text"/>	4. <input type="text"/>
5. <input type="text"/>	5. <input type="text"/>

Results

Total Hours

Sequence #	# of Tests	# Failed	Pass/Fail	Results
1.6.1.1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2.6.1.2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 10. Laboratory Document (Lab Doc) form open in edit mode to permit entry of work requested, and results.

When the lab doc has been filled out (ie. the analyst and work requested) clicking on the "Submit and Return to Job Card" button brings the user back to the job card and incorporates the lab doc information into the job card. At this time, the job card is complete and the user

may select "home" from the Navigator (Not the Netscape "Home" button) to return to the main job card view (See Figure 8).

NOTE: The Navigator is the gray bar at the top and bottom of the job card that has big, blue, circular "Back" button either above or to the left side of the bar. The Navigator also contains buttons for "Home", "Search", "Edit", "Print", "My Lab Docs", "Add Lab Doc", "Add Attachment" and "New Copy".

If work is to be performed in several labs or by several individuals, additional lab docs can be added to a single job card. This is done by pressing the "Add Lab Doc" button on the Navigator and following the procedure just outlined. These additional lab docs will also roll up to the job card to provide a consolidated view of the work to be done and the results.

Completing a Job Card

Once the work on a specific lab doc has been completed, the results are entered on the lab doc. This can be done by selecting the lab doc from the view menu and pressing the "Edit" button on the Navigator. The analyst should enter the date completed, hours charged, and the results. Clicking on "Submit and Return to Job Card" will save the modified lab doc.

If this is the last lab doc on a job card to be completed, then the system will consider the job card complete. The completed date is pulled from this lab doc, the hours are totaled, and the Contact will be e-mailed a message to review the job card. This begins the Review and Approval workflow in the Job Card System.

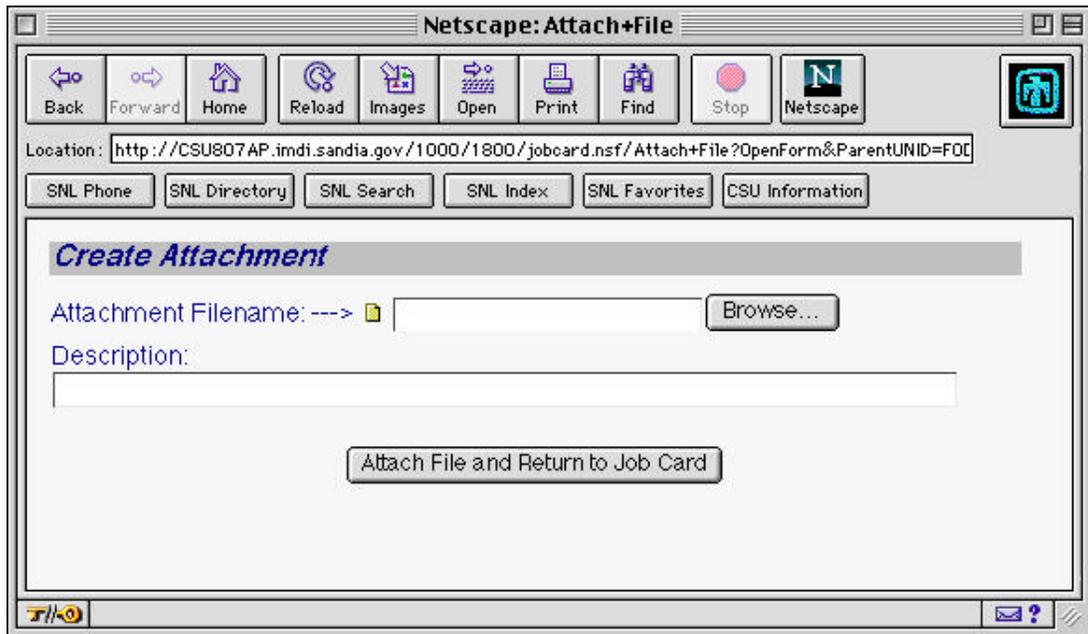
Copying a Job Card

When a sample to be tested is nearly the same as a sample already in the system, and the same tests are required, the job card already in the system can be copied. This is done by using the "New Copy" button on the Navigator **while viewing the job card to be copied**. This will create an exact duplicate of the job card with a new number. The new job card and lab docs **must be edited and submitted** in order to make them active and not a draft. In this way, some of the information can be changed during the edit process and corrections and additions can be made. This edit process also forces a review of the work by the Contact to assure that the correct work will be performed.

Remember, draft job cards and lab docs are deleted nightly so it is necessary to edit and submit the new copy of the job card and lab doc.

Attaching a File to a Job Card

Files can be attached to a job card to store raw data, spectra, reports, spreadsheets, etc. When viewing a job card, the user can attach a file by clicking on “Add Attachment” from the job card navigator (Figure 8) or the lab doc navigator (Figure 10). This will bring up the attachment form (Figure 11).



The screenshot shows a Netscape browser window titled "Netscape: Attach+File". The address bar contains the URL: `http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/Attach+File?OpenForm&ParentUNID=FOI`. Below the address bar are several navigation buttons: Back, Forward, Home, Reload, Images, Open, Print, Find, Stop, and Netscape. A secondary set of buttons includes SNL Phone, SNL Directory, SNL Search, SNL Index, SNL Favorites, and CSU Information. The main content area is titled "Create Attachment" and features an "Attachment Filename: --->" label followed by a text input field and a "Browse..." button. Below this is a "Description:" label followed by a larger text input field. At the bottom of the form is a button labeled "Attach File and Return to Job Card". The browser's status bar at the bottom shows a file icon, a question mark, and a refresh icon.

Figure 11. Add Attachment form for attaching files to job cards.

This form requires that the user know the exact name of the file, including the directory path. A “Browse” button is supplied that will allow the user to browse their hard drive for the file they wish to attach. This will bring up a computer specific browser permitting the user to move from disk to disk and directory to directory to find the file.

Once the file has been selected, the user should enter a description of the file in the space provided and click on the “Attach File and Return to Job Card” button. **(Note: If you are in the middle of entering data into a lab doc and you select “Add Attachment”, the data you were entering will NOT be saved. The only way to save lab doc data is to “Submit” it PRIOR TO moving to another form or view.)**

Reviewing and Approving Job Cards

Once all of the lab doc's have been completed, the Contact is instructed via e-mail to Review and Approve the work prior to management approval. This provides an initial check on the data by knowledgeable staff to assure the validity of the data or request additional tests. The Review and Approvals view (Figure 12) shows only those job cards which are ready for review by a person currently logged on to the system.

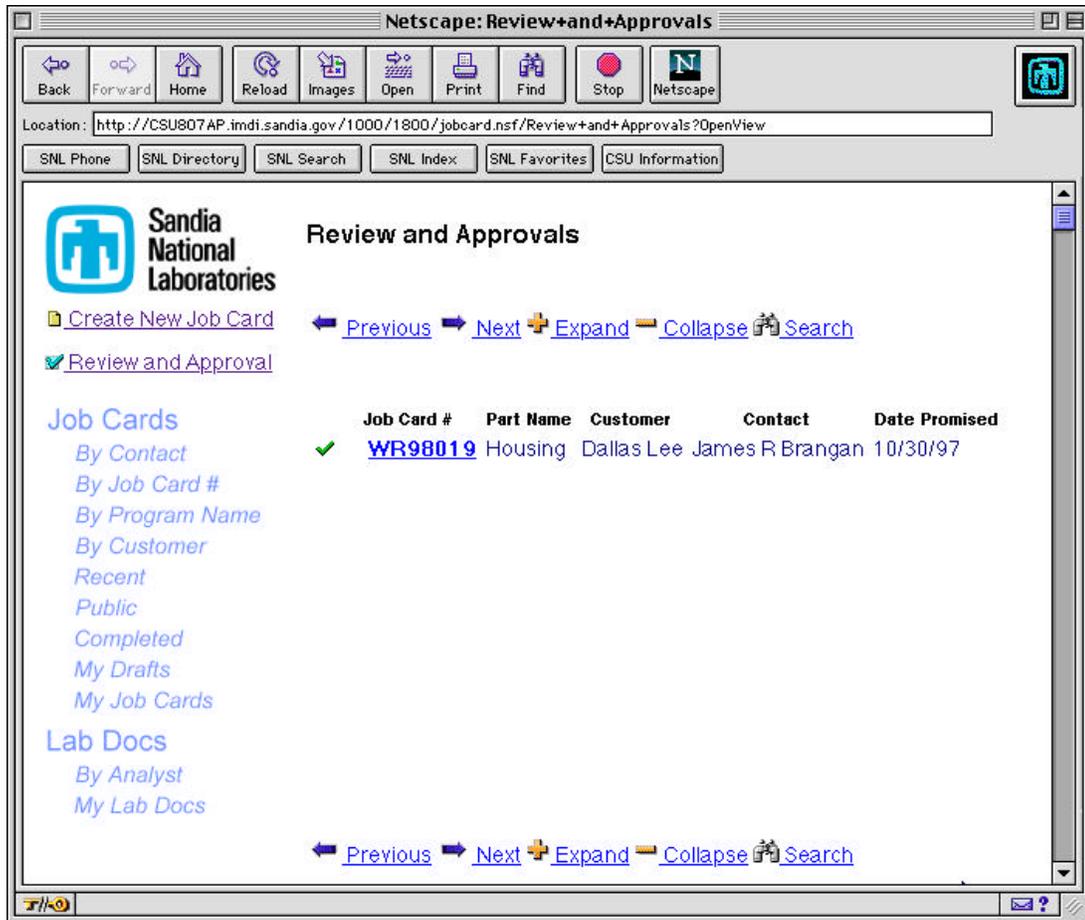


Figure 12. Review and Approvals View.

Once the contact approves the job card, e-mail is generated to inform the manager that the job card is ready for his approval. The job card will no longer appear on the contact's Review and Approval list. When the manager is ready to approve the job card, the same view is presented to the manager. Following management approval, e-mail is sent back to the contact stating that the job card has been approved.

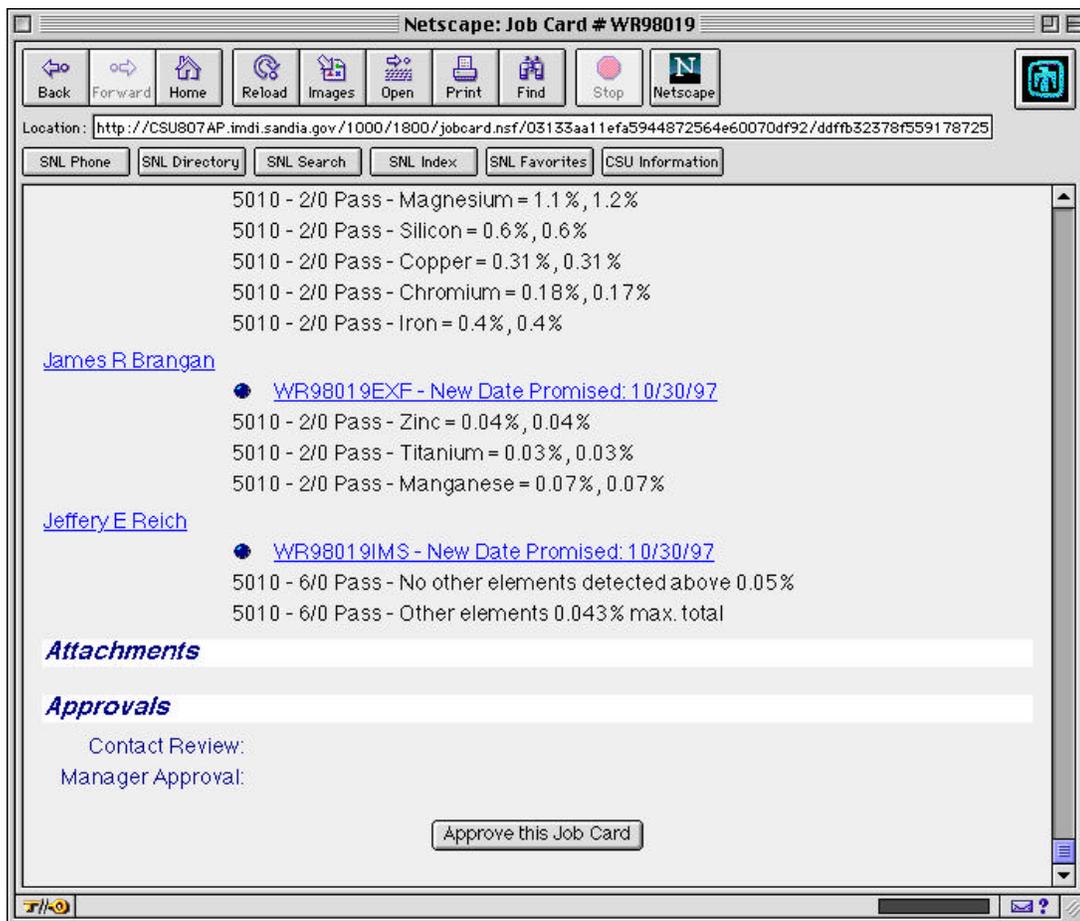


Figure 13. Bottom of Job Card Approval form showing results, attachments, approvals, and the “Approve this Job Card” button.

For cases where the job card prefix begins with “WR”, the customer is e-mailed about the approval of the job card at the same time as the contact. This lets the WR customer know that the sample and results are ready to be picked up from the designated storage area.

Other Views of Job Cards and Lab Docs

Job card and lab doc summaries may be sorted and viewed in a number of different ways as can be seen on the main view (Figure 6). Job cards views are “By Contact”, “By Job Card #”, “By Program Name”, “By Customer”, “Recent”, “Public”, “Completed” “My Drafts” and “My Job Cards”. Lab doc views are “By Analyst” and “My Lab Docs”. Brief descriptions of these views are as follows:

By Contact - lists job cards currently being analyzed by the contact who is responsible for the job card. Individual job cards are listed under the contact along with the program, part name, customer, and data promised. Individual lab docs are listed under the job card.

By Job Card # - lists job cards currently being analyzed by the job card number, in order. Along with the job card number is listed the part name, program, customer, and date promised. Individual lab docs are listed under the job card. If the part name, program, etc. were not entered on a job card then these fields will be blank in the view.

By Program Name - lists the job cards currently being analyzed by the program name in alphabetical order. Along with the program name is listed the job card number, part name, and date promised. Individual lab docs are listed under the program name.

By Customer - lists the job cards currently being analyzed by the customers name in alphabetical order by first name. Job cards are listed below each customer along with the part name, contact and date promised. Individual lab docs are listed under the job cards.

Recent - lists the job cards that have a status of “Finished Last Week”, thus were completed and approved within the last 2 weeks. Along with the job card number is listed, as appropriate, the program, part name, specification number, Sandia lot number, customer, and date completed. Individual lab docs are listed under the job cards.

Public - lists job cards beginning with the prefix “WR” by those that are “Finished Last Week” (a.k.a. Recent) and “Underway w/Analysis”. These job cards are further broken down by customer, part name, Sandia lot number, and specification number. Individual lab docs are listed under the job cards.

Completed - lists the job cards that have a status of “Completed and Archived”. After 2 weeks of being completed and approved, the Job Card System automatically updates the status to “Completed and Archived”. Along with the job card number is listed the program, part name, specification number, Sandia lot number, customer, and date completed. Individual lab docs are listed under the job cards.

My Drafts - lists job cards that were submitted but have no lab docs, or were copied from another job card. Drafts are deleted every evening and are discouraged because job cards and lab docs can be edited at a later date to prevent the use of drafts. Drafts also take up a job card number which is not reset when the draft is deleted by the system.

My Job Cards - lists those jobs that are currently being analyzed for which the current user is the contact. These jobs are listed by part name, job card number, and date promised. Multiple job cards for the same part name are listed below a single part name.

Lab Doc View - by Analyst - lists the lab docs that are currently being analyzed by the analyst. Along with the lab doc is listed the job card number, part name, customer, and date promised.

Lab Doc View - My Lab Docs - lists the lab docs that are currently being analyzed for which the current user is the analyst. These jobs are listed by part name, lab doc number, and date promised.

Changing the Job Card and Lab Doc Views

Job card and lab doc views have the Lotus Domino predefined features at the top and bottom of the each view. These features include “Previous”, “Next”, “Expand”, “Collapse”, and “Search”. Of these, the first 4 are used to change the content that is currently being viewed. These features function as follows:

Previous - like a Previous Page command, used to scroll backwards through the list of job cards or lab docs.

Next - like a Next Page command, used to scroll forwards through the list of job cards or lab docs.

Expand - expands to display all of the information on all of the job cards.

Collapse - collapses all of the information in the view to the first column heading. This allows for individual expansion of the jobs and reduces the number of pages that the views require.

One feature of the views is called a twistie (the blue triangle next to item in the first column). Clicking on a twistie will expand or collapse the information, depending on the direction the twistie rotates. If the twistie is rotated up (points to the right), then the information is collapsed, and if the twistie is rotated down (points down), then the information is expanded. In this way, most of the information can be collapsed, while the important job can be expanded individually.

Using Search to Find Information

One major problem with the paper job cards was the inability to quickly and easily find information across many such cards. This can now be accomplished by the last predefined feature on the views menu called “Search”. It is used to create a subset of job cards, selected from that view, that meet the search criteria. Clicking on “Search” brings up the following form (Figure 14).

The screenshot shows a Netscape browser window titled "Netscape: Full Text Search". The address bar contains the URL: `http://CSU807AP.imdi.sandia.gov/1000/1800/jobcard.nsf/a6baf934bc3339ad872564cd1`. Below the address bar are several navigation buttons: Back, Forward, Home, Reload, Images, Open, Print, Find, Stop, and Netscape. A row of buttons below that includes SNL Phone, SNL Directory, SNL Search, SNL Index, SNL Favorites, and CSU Information. The main content area is titled "Full Text Search" and contains a search form with the following elements:

- A text input field with the placeholder text "Search for the following word(s):" and a "Search" button to its right.
- A "Limit results to:" section with a dropdown menu currently set to "All".
- A "Sort results by:" section with three radio button options: "Relevance" (selected), "Oldest first (by date)", and "Newest first (by date)".
- A "Word options:" section with two checkbox options: "Find exact word matches only" and "Find word variations as defined by thesaurus".

The browser's status bar at the bottom shows "Document: Done." and a help icon.

Figure 14. Search form, one of the predefined features of Lotus Domino.

To use search, simply fill in the information you wish to search for and press the “Search” button. The results will be listed in the same manner as the view that was being searched.

It is important to understand that search only operates on the jobs within the view that is being searched. For example, to search for a specific case number being used on ANY job card, it would be important to search the “Completed” view, the “by Job Card #” view, and the “Recent” view. Searching just the “Completed” view would ONLY give results from the job cards that were completed at least 2 weeks ago.

Search is also very specific. To search for a case number, all 10 digits must be used (as it considers the case number a “word”). As with most searches, parts of a word do not count!

Job Card System Administration

The Job Card system is administered using a Lotus Notes client attached to the Domino Server. The client permits the administrator to see “hidden” views that are not visible from network browsers. These views include: Administration, Approvals-Lookup, Icons, and Job Card Lookup. All of these views are used to manage and/or display information, and the Administration form changes the way the system operates.

A Paradigm Shift

A shift in the way database applications are developed and used was required in order to implement the new system. After installing the Domino server and a Notes client, it was apparent that this program would serve as the database as well as the “Web Engine” needed to place the system on the internal Web. A brief discussion of how Lotus Notes functions will provide a better understanding of this.

The first difference between modern database systems and Lotus Notes is the lack of a screen driven system. Most databases guide the user through the activities that need to be performed via a sequence of “screens” or “forms”. In Notes, the user is presented with a preselected view of the contents of the database and a few choices to add to or modify the database. These choices lead directly to the database itself. While it is possible to provide a “front end” interface for the user (called a Navigator), in Notes, it is unnecessary.

Modern database systems use “tables” to store data which is collected from the user. To provide a nice interface, one or several “forms” are developed to guide the user through the data entry and modification process. These “forms” are basically empty, organized fields which are filled with data from the “tables” of the database. Lotus Notes uses “forms” as well, but these “forms” are serve as both the data entry medium and the data storage medium (or table). In Notes, the developer does not need to create a storage area for the data, it is the form.

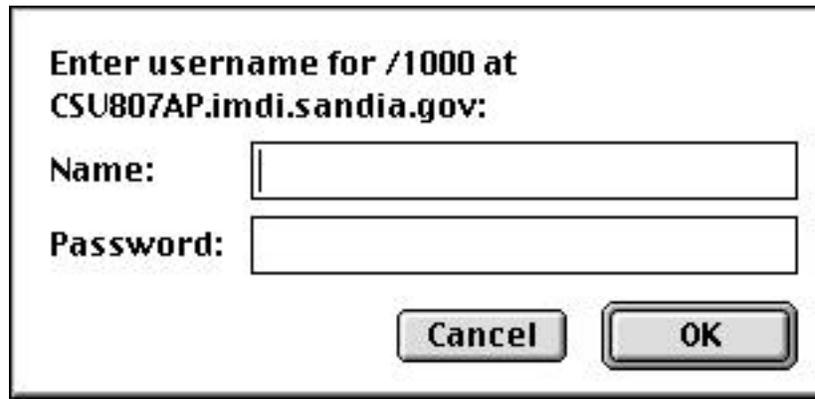
Another conceptual difference lies in the displaying of the data. Modern database systems use “reports” to provide the user with the data they request. These reports are created to provide a pretty picture of the requested data. In Notes, tabular data is provided in what is termed a “view” which is a picture of selected data contained in the forms. Looking at individual data sets is accomplished by displaying the “form” to the user. This is the same form that is used to collect and modify the data in the database.

With these concepts in mind, it should come as no surprise that in order to interface Notes with an ODBC compatible database, one must design “forms” in Notes for data input/modification and “views” to display the data. By doing so, one has created a Notes database. This lead to the abandonment of using Notes as just a “Web Engine” and using it as the database as well.

Job Card System Security

Security is a must with any database, and especially when working with the Internet. The Job Card System uses a "username" and "password" to authenticate users to the system (Figure 15) and allow them to add or modify the data within the system. New users (contacts and analysts) are added using a Lotus Notes client and must be placed in the server Address Book

in the proper places to utilize the system. It is the job of the system administrator to see to it that the users are entered properly and the logins function as required.



The image shows a login dialog box with a black border. At the top, it reads "Enter username for /1000 at CSU807AP.imdi.sandia.gov:". Below this, there are two input fields. The first is labeled "Name:" and the second is labeled "Password:". At the bottom of the dialog, there are two buttons: "Cancel" on the left and "OK" on the right.

Figure 15. Login Screen used to authenticate users.

Anonymous access is available by pressing the rotating "enter" button on the main browser menu. Anonymous users have "read" access only to job cards beginning with "WR". Other jobs are hidden from these users and they are not able to modify any of the data. If an anonymous user attempts to add or modify the data in the database, he will be asked for a "username" and "password". A system error will result if these are not provided or are improper.

Access control is specified in the database "access control" section. To get to this section, highlight the database in the Notes Client and press "File", "Database", then "Access Control". A list will appear showing all of the people, servers, and groups that have access to the database and at what levels. Along with this access are the "roles" that these users are allowed to have. "Roles" for the Job Card System are "Anonymous", "Analyst", "Contact", "Customer", and "Manager". The only people who should have the "Anonymous" role are the "default" users. Analysts and Contacts should have the roles "Analyst", "Contact" and "Customer". The customers should have the role "Customer". The system administrator should have the roles "Analyst", "Contact", "Customer", and "Manager".

Administration View and Form

From Lotus Notes, the administration view is seen to contain a single form called “Administration”. This form contains information on job card prefixes, the last job card number for each prefix, the filename of the address book, the name of the manager, the current fiscal year, the name of the group for customers and contacts, and a list of suffixes. In order to administer the Job Card System this document must be edited to add the correct information based upon the organization. Names and groups are taken from the system Address Book, so new people and groups must be added prior to making changes to this form.

To get to this view, the administrator should click on the “Administration” icon (looks like a magnifying glass) or name on the views side (left side) of the Notes Folders and Views in Figure 16. This will present the exact screen as shown in Figure 16. The “Administration Profile” form (under Title on the right) can be accessed by double clicking on the name. This will open the “Job Card Configuration Profile”, Figure 17.

In the Notes client, the administrator uses the same “point and click” methods to access all documents, views, and databases.

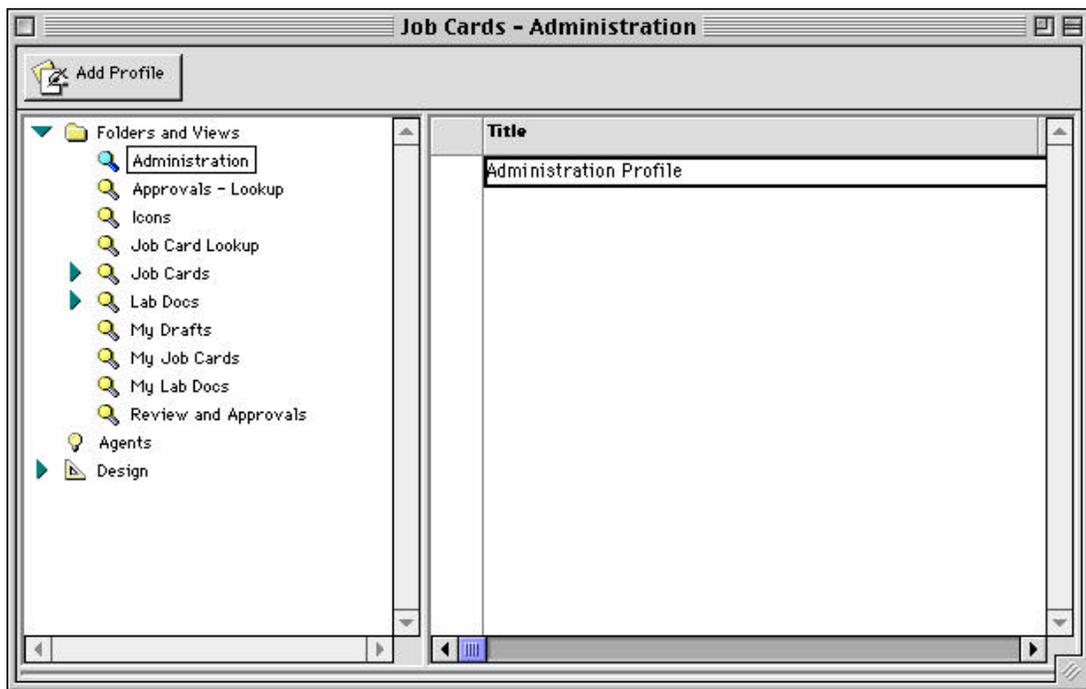


Figure 16. Administration view from Lotus Notes Client.

(Untitled)

Close Edit Profile Print

Job Card Configuration Profile

Job Card Prefixes

Job Card Prefix	Description	Sequential Counter
WR	War Reserve (Production)	024
XRF	X-ray Fluorescence Laboratory	004
GMD	Gas Analysis Laboratory	005
CAL	Chemical Analysis Laboratory	007
		000
		000
		000
		000
		000
		000
		000
		000

The number of unused job cards:

Fiscal Year Ends in the Month of: October	Current Fiscal Year: 1998
Standard TurnAround time in days: 21	Job Card Status Choices: Awaiting Sample Underway w/ Analysis Finished Last Week Completed and Archived

Address Book to be used for System Users: names.nsf

Group to be used for Contacts/Analysts: Dept 1824

Group to be used for Customers: 1824 Customers

Designated Manager for Approvals: Michael R Keenan

Lab Doc Suffixes

Lab Doc Suffix	Description
AA	Atomic Absorption Spectroscopy
AUG	Auger Spectroscopy
CHN	CHN Elemental Analysis (Perkin-Elmer)
EDA	SEM w/Energy Dispersive XRF Analysis
EXF	Energy Dispersive X-ray Fluorescence

Figure 17. Administration Form as viewed by Notes Client.

When the fiscal year changes, the administrator needs to change the fiscal year and reset the job card number (counter) to “000”. This will make the next job card number “001”.

Approvals Look-up View

This view (Figure 18) displays a copy of the job cards that are in the process of being reviewed and approved. Some of these job cards are outdated duplicates and some are “deleted” but are still in this section. Deleting these does not cause the actual job card to be deleted, but it can effect the “Review and Approval” on the Web side.

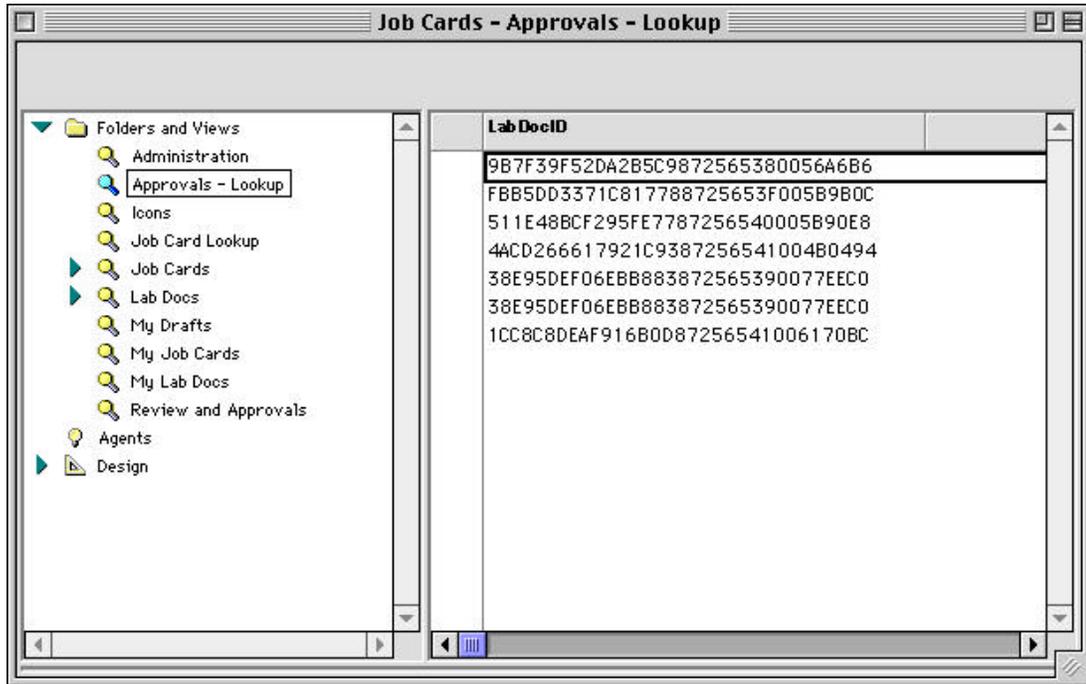


Figure 18. Approvals Lookup view from Notes Client. The LabDocID is the Notes assigned file name of the job card to be reviewed.

Cleaning up the Review and Approvals View

To determine whether a job card/lab doc in this section should be deleted, a view of the “Properties” and “Fields” is necessary (Figure 19). The properties are opened by using the “File”, “Database”, “Properties” menu or by clicking on the “Properties” icon on the upper left side of the icon menu in the Notes client. The job card field “kind” will describe the card as “incoming”, “narrative”, “both”, or “deleted”. Those job cards that are of the “deleted” variety can be marked for deletion without any effect on either system (in fact, this cleans up the Web-based side).

“Deleted” job cards should be automatically removed by an agent that runs late at night, however, sometimes this agent doesn’t work. This is why, at times, “Deleted” job cards remain on the “Review and Approval” view in Notes.

Job cards without a “Manager” field are awaiting approval by the contact. It is important to check the “ContactLogin” field to make sure that it is not blank. If it is, the system will not be able to identify the contact and the the job card cannot be approved. It can therefore be deleted.

Extra copies of job cards can also be in the awaiting approval state. This happens when a lab doc attached to a job card has been edited after it starts the review cycle. This causes the contact to have 2 job cards to approve (one prior to the edit and one after the edit). Only the last one contains the correct information. The first of these is therefore obsolete and, although it doesn't effect the system, should be eliminated as it no longer applies. Unfortunately, it still resides on the review and approval list for either the manager or the contact.

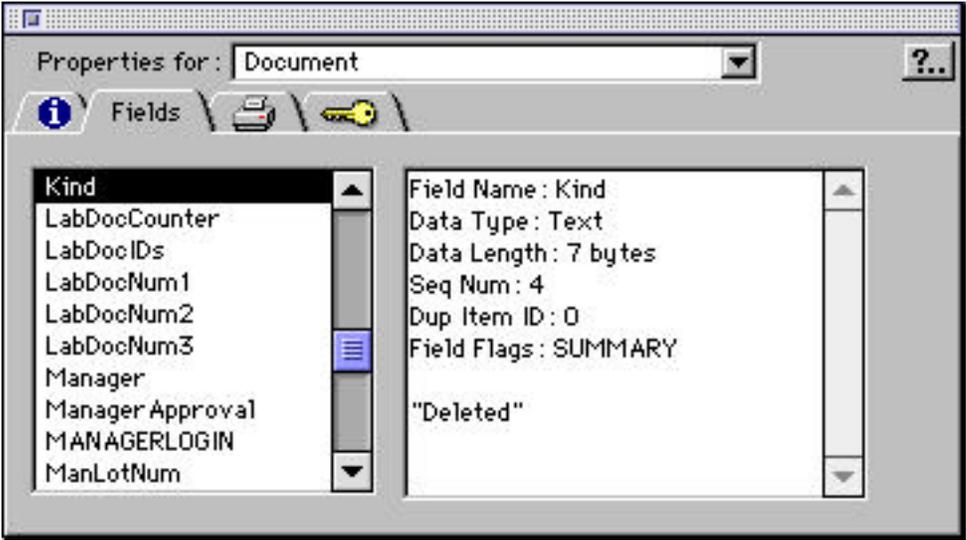


Figure 19. Document properties form showing the fields, their types, etc. on a job card in the Review and Approval cycle.

Icons View

The icons view (Figure 20) contains the icons that are displayed in various parts of the Job Card System. These icons vary from “blue bullets” to the spinning “enter” icon. There is no need to work with this view or these icons.

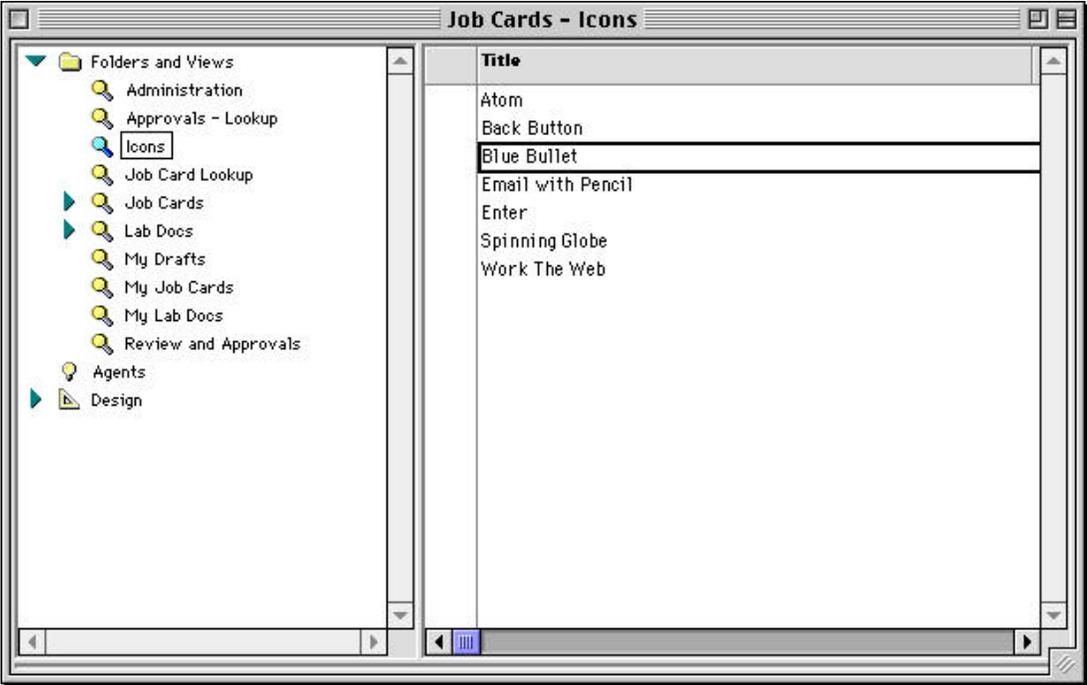


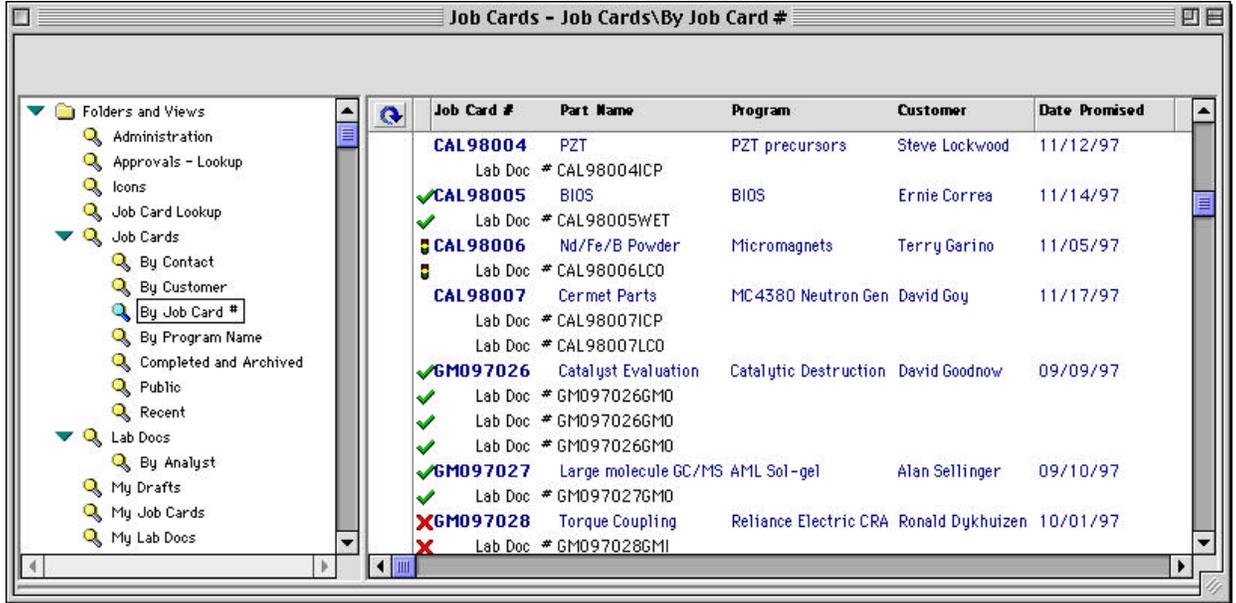
Figure 20. View of the icons used in the Job Card System.

Job Card Lookup View

This view was used for development of the system and is not very useful. Job cards can be viewed under the various “views” under “Job Cards”.

Other Views

It should be noted that not all views (Figure 21) are available when using the Lotus Notes Client. This is because Notes doesn't know who the user is and cannot determine what "My Lab Docs" or "My Job Cards" are.



Job Card #	Part Name	Program	Customer	Date Promised
CAL98004	PZT	PZT precursors	Steve Lockwood	11/12/97
Lab Doc # CAL98004ICP				
✓ CAL98005	BIOS	BIOS	Ernie Correa	11/14/97
✓ Lab Doc # CAL98005WET				
✗ CAL98006	Nd/Fe/B Powder	Micromagnets	Terry Garino	11/05/97
✗ Lab Doc # CAL98006LCO				
CAL98007	Cermet Parts	MC4380 Neutron Gen	David Goy	11/17/97
Lab Doc # CAL98007ICP				
Lab Doc # CAL98007LCO				
✓ GM097026	Catalyst Evaluation	Catalytic Destruction	David Goodnow	09/09/97
✓ Lab Doc # GM097026GM0				
✓ Lab Doc # GM097026GM0				
✓ Lab Doc # GM097026GM0				
✓ GM097027	Large molecule GC/MS AML Sol-gel		Alan Sellinger	09/10/97
✓ Lab Doc # GM097027GM0				
✗ GM097028	Torque Coupling	Reliance Electric CRA	Ronald Dykhuizen	10/01/97
✗ Lab Doc # GM097028GM1				

Figure 21. Notes Navigator (left side) showing different views available from within the Notes Client.

The Server Address Book

The Address Book on the server is the most important database in Notes and Domino. It controls the entire operation of the Domino system including: which servers it is linked with, how many clients are in use, what users are listed on the system, etc. There are several sections in the Address Book including: groups, people, servers, etc. Of these, the "people" and "groups" sections are key to the Job Card System.

The "people" section (Figure 22) is where all people whose names will be needed by the Job Card System must be stored. The names are listed in alphabetical order, sorted by last name. Each "person" form contains specific information on the type of user, permissions, Notes Client authentication, etc. For the most part, the people in the Address book are just plain users of the database from a web browser.

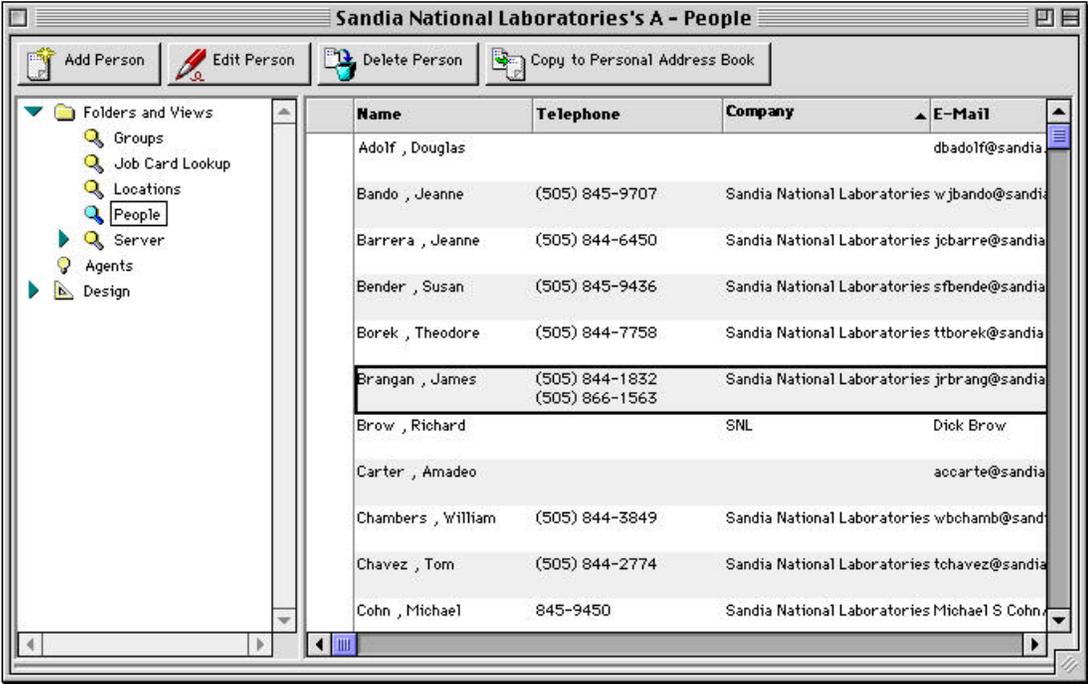


Figure 22. Server Address Book showing "People" view from Notes Client

The "groups" section (Figure 23) is used to place people into organized clusters for access control. By adding a "group" to a database access control list, every person in that group has the same access to the database. This makes it easy to set up access for a new user since they only need to be added to the proper group.

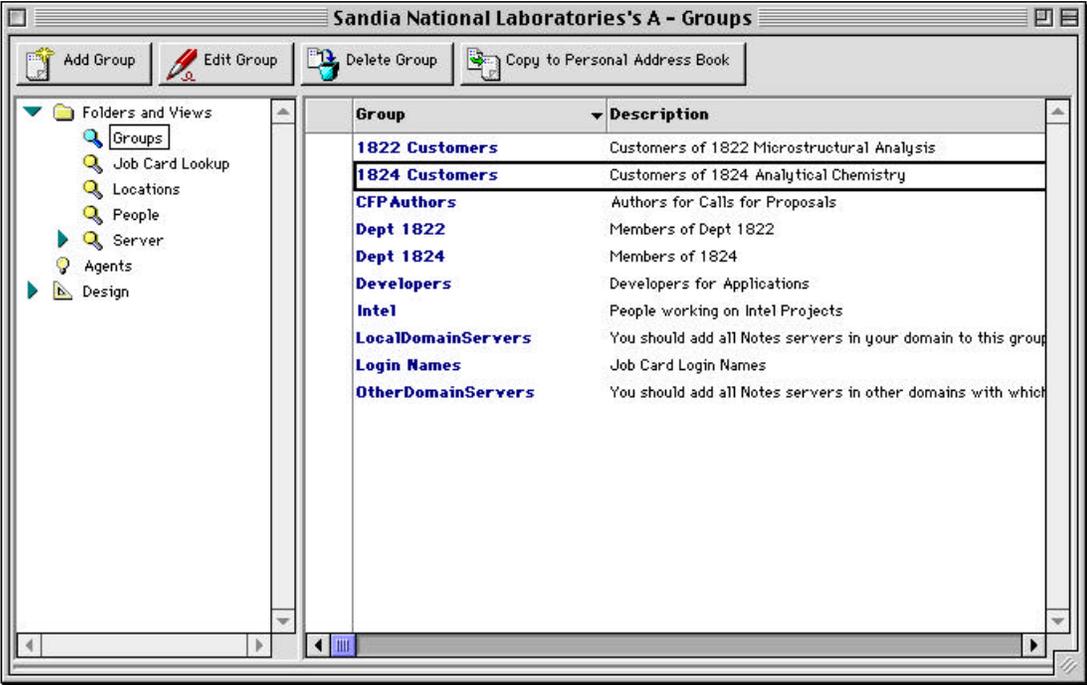


Figure 23. Server Address Book showing "Groups" view from Notes Client.

Adding a New Contact / Analyst

In the Job Card System, a Contact or Analyst must have access to the system which will allow them to add new job cards, modify existing job cards/lab docs, and review/approve the job cards that are completed. These individuals must login to the system from their web browser to let the system know that they are allowed these privileges. Setting up a new Contact/Analyst is done by adding them into the server Address Book in various sections.

Add person to "people" section in Address Book

The new user must first be added into the "people" section. This is done by selecting "add person" from the "people" view in the Address Book. The important fields to enter are shown in Figure 24.

The screenshot shows a web browser window titled 'sfbende'. At the top, there are buttons for 'Close' and 'Edit Person'. Below this is a header for 'PERSON: sfbende' with the email address 'sfbende@sandia.gov'. The form is divided into several sections:

Name		Mail	
First name :	Susan	Mail system :	Internet
Middle initial :	F	Domain :	
Last name :	Bender		
User name :	sfbende Susan Bender Susan F Bender		
Short name :	sfbende	Internet address :	sfbende@sandia.gov
HTTP password :			
Work		Home	
Title :		Street address :	
Company :	Sandia National Laboratories	City :	
Department :	Analytical Chemistry	State/province :	
Organization :	01824	Zip/postal code :	
MailStop :	0343	Country :	
Location :		Home phone :	
Manager :		FAX phone :	
Office phone :	(505) 845-9436	Spouse :	
FAX phone :		Children :	
Cell phone :			
Assistant :			

Figure 24. Server Address Book "Person" form as viewed from Notes Client.

All of the information filled in on the example "Person" form (Figure 24) is used by the Job Card System. The "User name" field is especially critical because it is used to link the login name with the users true name. The short login name MUST be the FIRST name on this list. Other names can reside in the middle, and the full name MUST be the LAST name on the list. After all of this information has been entered, click on the "save" button at the top of the screen followed by "close". If you do not click on "save" first, the person is not added into the Address Book.

The "Person" form is used by the Job Card System to obtain the rest of the information about this person for the pull down menus. Without the organization, phone number, and mailstop, these fields will be left blank on the job cards as they are created and modified. Furthermore, without the username and other fields filled in correctly, the system may not recognize the user and let them work with the system.

Add new contact / analyst to the "Dept" group in the Address Book

With the new person in the "people" section, the new contact must be added to the "Dept XXXX" group in the Address Book. To do this:

- 1) click on the "groups" view in the address book (Figure 23).
- 2) Find the department that this person belongs to and double-click on it. (Ex. Dept 1824).
- 3) Click on the "Edit Group" button at the top. This will open the group form (Figure 25).

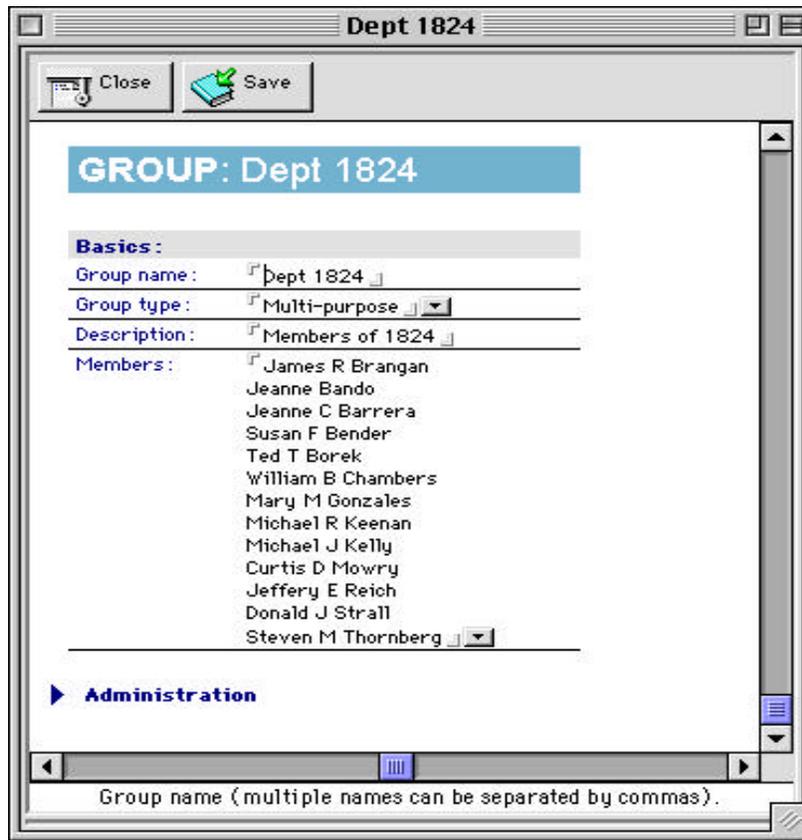


Figure 25. Dept 1824 group opened in edit mode from Notes Client.

- 4) At the lower right of the last name of the list is a small inverted triangle, click on it. This will open a dual list (Figure 26) to permit names to be entered from the “people” section of the address book.
- 5) Find the new contact in the left column and click on their name.

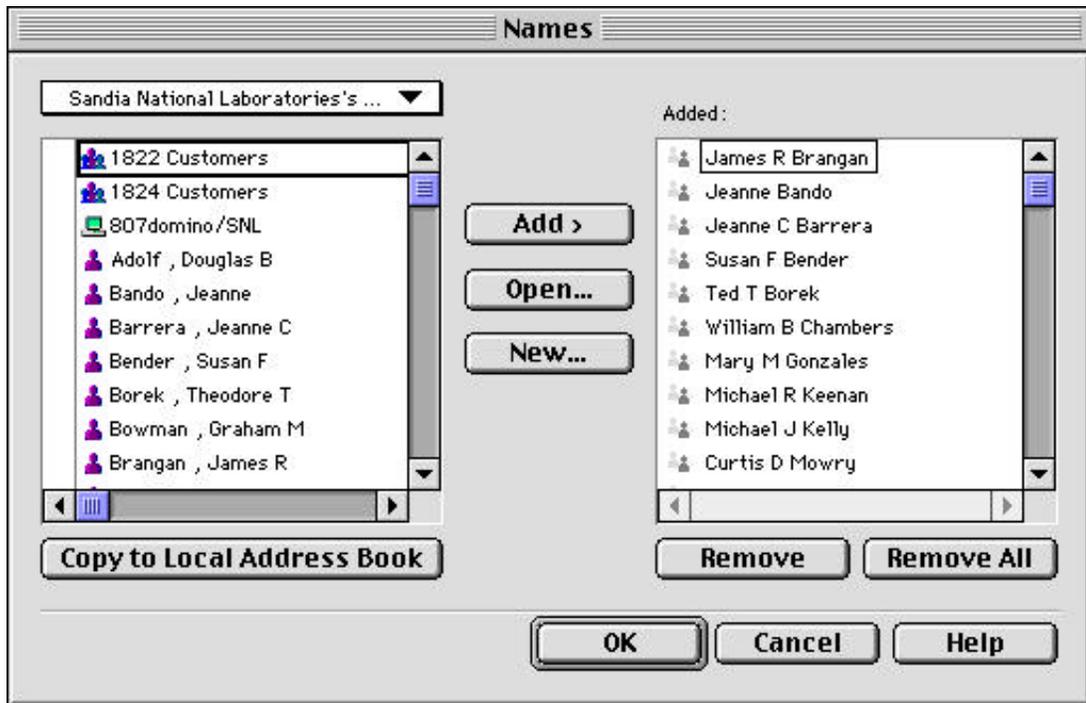


Figure 26. Dual list of: names from the address book (left) and names in the group (right).

- 6) Click on the "Add>" button. This should move the person's name to the list on the right.
- 7) Click on, then drag the person's name up the list to reposition the new contact.
- 8) Click "OK" to close the window
- 9) Change the contact's name to the LAST name on the list in the "User name" field on their "Person" form (see Figure 24).
- 10) Click on "Save" button, then on the "Close" to save the modified "Dept XXXX" list.

Add the new contacts short name into the "login names" group.

In a similar fashion to adding the new contact to the "Dept XXXX" group, the new contact must also have his short name added to the "Login Names" group (Figure 27). This is accomplished by:

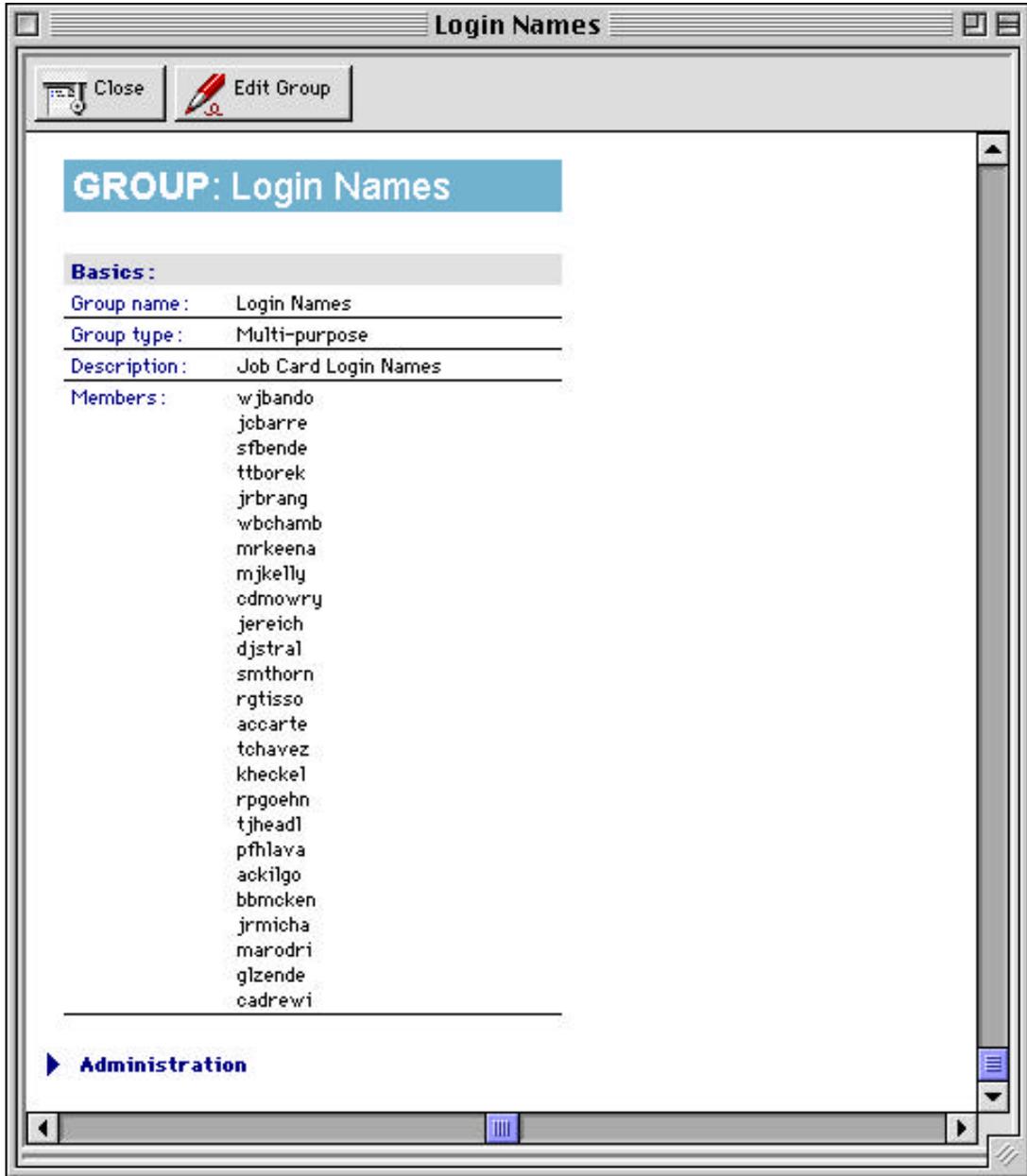


Figure 27. Login Names group on the Server Address book as viewed by Notes Client.

- 1) Double click on the "Login Names" group.
- 2) Click on the "Edit Group" button.
- 3) At the lower right of the last name of the list is a small inverted triangle, click on it.

- 4) Find the new contact in the left column and click on their name (see Figure 26).
- 5) Click on the "Add>" button. This should move the person's name to the list on the right.
- 6) Click and Drag the person's name up the list to reposition the new contact.
- 7) Click "OK" to close the window
- 8) Click on "Save" button, then on the "Close" button to save the updated "Login Names" list.

The new contact / analyst should now be able to login to the system and perform all of the tasks they need to do. The password they need will be the one assigned in the "HTTP password" field on their "person" form in the Server Address Book.

Adding a New Customer

This process is similar to adding a new contact / analyst, except that a few items can be left out.

Since the new customer is not going to access the system for editing, they do not need a "password" on their "Person" form in the Address Book (see Figure 24). This will not deny them anonymous access to the system, however, they can only view "WR" documents.

Instead of adding the "customer" to the "Dept XXXX" group, the new customer is added to the "18XX Customers" group (Figure 28). This is done in exactly the same way as adding a "Contact" to the "Dept XXXX" Group. The "18XX Customers" group does not have the same privileges as the "Dept XXXX" group and therefore the customer will be limited in what they can see or do.

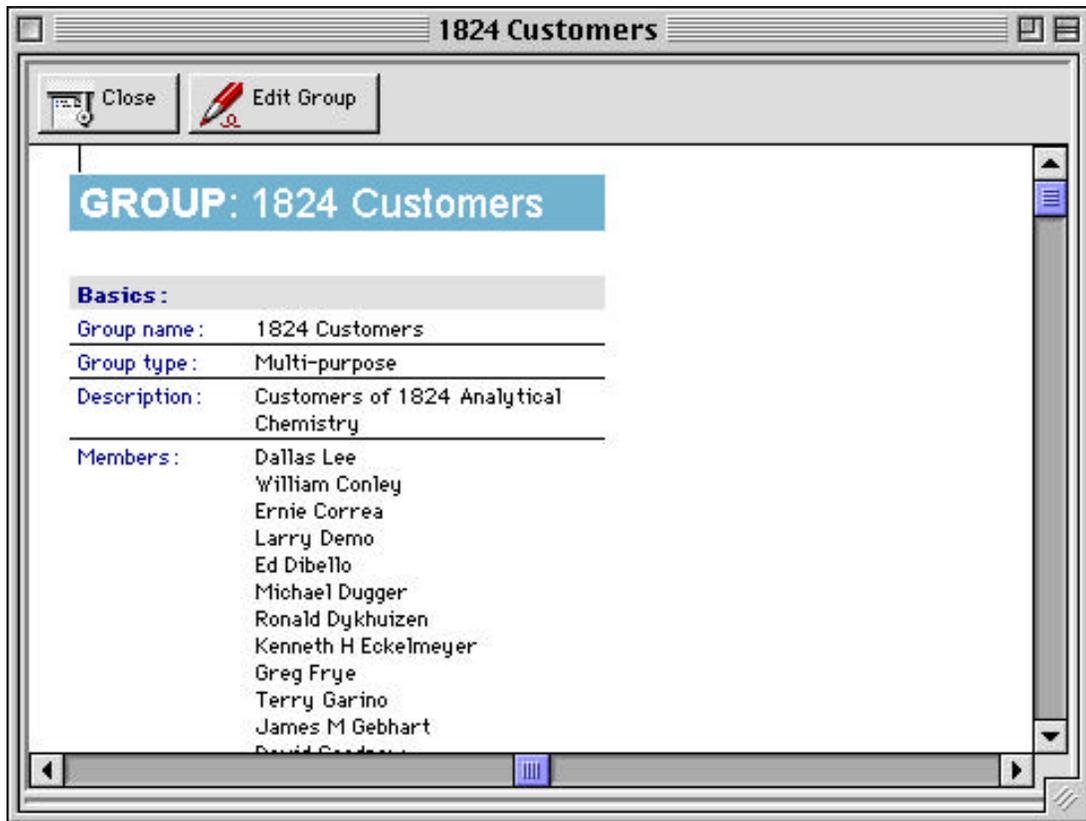


Figure 28. 1824 Customers group in Server Address book as viewed by Notes Client.

The new customer is NOT added into the "Login Names" group. This group is reserved for those needing "Add/Update" access to the Job Card System, e.g. Contacts and Analysts. This prevents the customer from being able to add or modify information in the Job Card System.

In the event that the new customer is also a member of one of the department groups, the customer's name MUST appear on the customer list EXACTLY as it appears in the LAST name in the User Name field on his person document (See Figure 24). If it does not, the system will not recognize either the contact or the user. The lack of recognition will cause the contact and customer to have missing information in the organization, mailstop, and phone number fields. This will also cause the system to not recognize the contact later when the review and approval process has started.

Frequently Asked Questions (FAQ's)

User Questions

- Q1. When I enter a job card, the customer is not on the list. What should I do?
- A1. Use "New Customer" as a temporary placeholder for your customer and complete the entry of the job card. Advise your system administrator of the new customer and, once he has been added to the system, you can "Edit" the job card and change "New Customer" to your customer.
- Q2. I've attached a document and now I've discovered that the data is wrong. How can I change the data?
- A2. Unfortunately, at this time documents cannot be unattached from a job card. This will be changed in the next revision of the system.
- Q3. I entered a job card and the contact's and/or customer's organization, mailstop, and phone number did not appear. What's wrong?
- A3. One of several things might be wrong. First of all, the job card must be "Submitted" in order for the system to know to add the information. If you already "Submitted" the job card and this information is still not there, contact the system administrator.
- Q4. How do I find the file I wish to attach (use the browse feature).
- A4. Browse uses the same interface as your computer's operating system for finding files. To find a file, you must know what directory and subdirectory the file is in. Some operating systems are easier than others when it comes to knowing where a file is located. Refer to the help menu on your operating system for details. Hint: using a "Find File" command/program will usually show you the entire directory path to the file you are interested in.
- Q5. When I enter results into a narrative lab doc, I format them so they look nice, but after they are submitted, the formatting is gone on the job card. What's the problem.
- A5. Unfortunately, the formatting of the fields on the job card was not carried from the lab doc. This is being corrected in the next version of the job card system.
- Q6. The results on the job card are not completely what was in the lab doc and contain strange characters. What happened?
- A6. When you format the results on the lab doc, the formatting does not carry over to the job card (See Q5). Carriage returns, which are used to format the results, are also used to discriminate between the results. This causes problems with the html program code behind the job card system and causes the results to be shortened and the strange characters to appear.
- To fix this problem, edit the lab doc and remove all carriage returns from the results. Resubmit the lab doc and the job card contain all of the data without strange characters. This problem will be corrected in the next revision of the job card system.
- Q7. How do I remove the red "X" next to my work?

- A7. To remove the red “X”, edit the lab doc and add a “Renegotiated Date” (this is usually today) and a “New Promise Date” (which is when you expect the work will really be completed). This will remove the red “X” and show the new promise date as the date due.

Printing

- Q8. I clicked on “Print” on the job card navigator but the job card didn’t print. What went wrong?
- A8. Clicking “Print” on the navigator really does not cause the job card to be printed. It creates a print image of the job card without the navigators for a nicer look. Clicking the “Print” button on the Netscape button bar will cause the screen (and therefore the job card) to be printed.
- Q9. How do I remove the navigator bars when printing a job card?
- A9. Clicking “Print” on the navigator will remove the navigator and create a nice print image of the job card. However, it will not cause the image to be printed until the Netscape “Print” button is clicked on (See Q4).
- Q10. How do I get a job card printed on a single sheet of paper?
- A10. The answer is different for Mac’s and PC’s. For a Mac, go to “File”, “Page Setup” and change the “Reduce or Enlarge” percentage to a number smaller than 100% (See Figure 29).

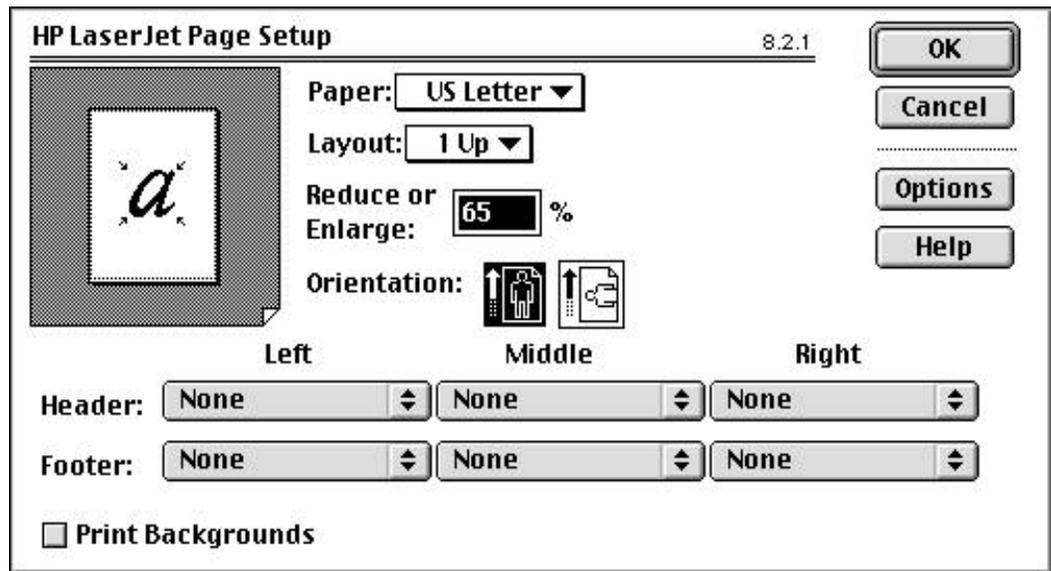


Figure 29. Page Setup in Netscape 3.0 for Macintosh computers.

On a PC running Windows 95 or Windows NT, the printer is controlled via the printer properties menu. This is activated by clicking on “Print”, then “Properties”, selecting the “Advanced” tab, and looking under the “Graphics” section for “Scaling”. If “Scaling” is available, then it can be changed to a value less than 100% until the job card prints on a single page. If “Scaling” is not available check with your printer manufacturer to determine if a new printer driver is available with this feature.

System Administration Questions

Q1. When a job card has been completed (all of the lab doc's are complete), the job card does not appear in the contact's list for approval.

A1. Several things may be wrong. First, check the "ContactLogin" field on the job card in the "Review and Approvals" view in Notes. If this field is blank (has "") then the contact cannot be recognized by the system. Check the contact's person document to see that the first name in the "User Name" field is their login name and that the last name is their full name.

It is also possible that the customer information is not correct. The customer must have a complete person document in the Address Book and their name in the customer group must correspond to the LAST name in the "User Name" field of that document. This will cause a lack of information in the organization, mailstop, and phone number fields on the job card.

Q2. The customer and contact names show up correctly on the job card but there is no associated information (mail stop, organization, phone number). How can I fix this?

A2. This is an indication that either the customer and/or the contact has been added incorrectly in the system Address Book. If the contact is not new then the likely culprit is the customer. Open the Address Book and check the "Person" document for the customer and the customer group. When the person has been added correctly, all of the information about the person will show up on the job card. (See the appropriate sections above under "The Server Address Book").

If the job card has been completed but needs to be reviewed, simply edit one of the lab docs and submit it. No information needs to be changed, but by resubmitting the lab doc, the review and approval cycle will be restarted and the contact will be notified.

Q3. How do I delete old review and approval records from the "Review and Approvals" view in the database.

A3. Using Notes to enter the "Approvals - Lookup" view, find the job card that needs to be deleted using the "Fields" tab in the "Properties" window. The job card number is listed under the field name "JobCardId". Click on each file until the correct job card number is found and then press the "del" key on the keyboard. This will put a blue box next to the file. Press <F9> to "Save" the file in the deleted state and click on "Ok" to actually cause the deletion to occur.

Q4. How can I add fields to the job cards that I need?

A4. Using a Notes client, the database "design" can be modified. Adding a field requires that the form(s) that are effected are known. Forms can be edited by double clicking on the form. Text is added by typing it in to the form in the appropriate place. Fields are added by using the "Create Field" command from the top menu bar.

CAUTION: Adding fields to a form changes the database since the forms ARE the database. In addition, future upgrades to the database that do not contain these "in house" changes will cause them to be deleted when the database is updated with new features.

For further information on Lotus Notes and Domino programming please consult references 1-3.

Future Improvements

As the new Job Card System is used, several features have been identified to help everyone. The following features are to be incorporated into the next release of the system:

1. the ability to unattach files from a job card.
2. a disapproval button for the manager which removes the job card from the “Review and Approval” screen and sends an e-mail message, which the manager enters into a form, to the contact.
3. adding an “indeterminant” to the “Pass/Fail” field on “Incoming” job cards for those cases where neither pass nor fail apply.
4. correcting a formatting problem with the “Description”, “Work Requested” and “Results” on Narrative job cards.
5. correcting the sample information labels that show up on the “Print” type job card.
6. developing a form that enables contacts to add new customers to the server “Address Book”.

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2. Kenyon Brown, et al., Mastering Lotus Notes 4.5, Sybex Inc., 1996
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