

CSC340 Assignment 3
DAMS System Design
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Introduction

In the current economy a company in virtually any industry faces the formidable task of keeping up with rapid advances in technology. A company that is to be successful must necessarily identify the area of most expertise within its range of services and seek to employ recent developments in information technology in order to gain a competitive edge within that area of expertise.

With the exception of a few select industries it is impossible for a company to offer an industry-wide range of services at the level that would be preferable by a consumer over their competitors. Companies that attempt to satisfy too wide of a range of consumer needs find themselves struggling to maintain a level of service that is superior to their competitors'. As a result, such companies tend to perform much poorer than those that sacrifice the number of services they offer in favor of extensive expertise in a narrower range of services.

A company's biggest asset is the wealth of previous knowledge and experience within its field of operations. The ability to have access to resources from previous projects enables a company to perform analyses of their current tasks in terms of past experience. It also enables the company to reuse a number of resources employed or developed in previous projects in the process of completing new tasks. Finally, it gives the company the ability to offer to their clients a long term service where the wealth of knowledge accrued from previous interactions with the client can aid the company in providing new services at a higher level of understanding of client needs.

Ultimately, the extent to which a company can employ its current knowledge in completing new tasks determines the company's ability to properly assess their clients' needs, determine viable solutions to clients' problems, and develop these solutions efficiently.

A company whose range of services consists of producing digital media for advertising possesses an overwhelming amount of digital information that, if properly organized and maintained, can be used extensively in the company's new undertakings. Such a company will possess third party digital media libraries as well as repositories of digital media created by the company itself. The ability to query this information will enable to company to improve their level of service by

providing company employees with an efficient means of consulting with large databases of digital media for the purpose of creating new media for their projects. It will also allow the company to present their client with a history of various digital media created for that client to aid the design of long term advertising campaigns.

A client in turn, would much prefer to deal with a company that can offer a comprehensive strategy that would adequately address the client's advertising needs in the long term. It is not enough to offer a campaign targeting a specific group of consumers. Later campaigns need to be designed with the achievements and shortcomings of the current campaign in mind. This is only possible through extensive maintenance and analysis of all previous project information and clearly sets a company with this ability apart from the others in the eyes of the client.

We have clearly established the need for a company to be able to query and reuse previous project information if it is to be successful in the current economy; the means to do so are presented in the rest of this paper in the form of a design of an information system that maintains and manages the digital resources of Southside which is a graphics production studio within Arnold Worldwide Canada Inc.

The Company

The company was established in 1924 under the name Vickers & Benson Inc. with an office in Toronto, Canada. The company operated under that name for the next 76 years during which it made itself quite a name in Canadian advertising. Along with the name came a long list of respectable clients, several hundred employees, and an additional office in Chicago, USA.

On February 22, 2001, V&B changed its name to Vickers & Benson Arnold Inc. as a result of an acquisition by Havas Advertising, which is the world's fifth largest communications agency. Under Havas a partnership was formed between V&B and Arnold Inc., a US advertising agency. The new name was due to this partnership.

During the course of the next two years several other companies joined the Arnold partnership and on March 26, 2003 Vickers & Benson Arnold Inc. became Arnold Worldwide. Under this name the agency services clients in Argentina, Australia, Brazil, Canada, China, France, Germany, Italy, Japan, Mexico, Spain, the United Kingdom and the United States.

At the heart of Arnold Worldwide's Toronto office lies their graphics production studio Southside. All of Canadian still image campaigns as well as some work for the US are produced at Southside. Out of the Toronto office's 180 employees 38 belong to the studio. The graphic designers at the studio are a team of extremely skillful professionals whose creative talents have provided some of the world's largest companies with top-notch advertising for the last 80 years.

Over the years the studio serviced such clients as McDonald's, Bank of Montreal, Harris Bank, Business Development Bank of Canada, CB Richard Ellis Ltd., Volkswagen, Lennox Industries, M&M Meat Shops, Sprint Canada, Canadian Tire, Monster.ca, Ocean Spray, Office Depot, Ralston Purina Canada Ltd., Royal LePage, and many more.

The industry itself and the sort of clients that Southside services are such that the greatest degree of care needs to be taken in acquiring and employing every bit of information about the client and the campaign they may want to run. After all, in this industry it is not the client that comes to an agency requesting an ad campaign to be

produced. Instead, a client signals her intent to run a series of campaigns and a number of agencies interested in the work produce preliminary designs and strategies to showcase their abilities. The client then inspects the work of several agencies and chooses one that fits them best to become the agency responsible for that campaign or set of campaigns, or even become the agency responsible for all of the client's advertising within a particular region or country.

The ability to win such pitches to new clients and the ability to maintain ongoing relationships with existing clients directly determine a company's degree of success in the advertising industry. These abilities come from wielding a certain kind of power - the power of information.

The agency needs to know everything about a client. What sort of history do they have? What sort of image are they trying to uphold? What promise are they delivering to their consumers? Who their consumers are and what types of media they are most exposed and responsive to? The agency must be aware of their clients' strong and weak points, the campaigns they have ran in the past, the ideas that worked well and not so well for them.

In addition, the agency needs to know everything there is to know about the type of campaign they are currently pitching to the client. They need to be able to supply the client with extensive information on where these types of campaign were used before, by what clients, what sorts of consumers do they appeal to, what has the response of the consumers to these campaigns been in the past.

In the end, the client needs to be confident that they are spending money on something that suits their needs best, that will expose the client's strong sides and will downplay their weaker sides, that the message the agency puts out will be something the client can put their respectable name behind, that this message will appeal to the consumers and will drive them to purchase the goods or services the client offers, and will ultimately increase the client's revenues enough to justify expending their money on running the campaign.

Although this information can be hard to come by for new clients, it can certainly be acquired for those clients who have a long running relationship with the agency, if all information relevant to a client is properly recorded. An information system consisting of a set of tools created for the purpose of recording, maintaining and querying information related to various clients and projects can become an

advertising agency's biggest asset second in importance only to creative talents employed at the agency.

Arnold Worldwide, Toronto, specializes in establishing long term relationships with their clients and evolving their brand names in the eyes of both the consumers and the clients themselves. They seek to provide the clients with a comprehensive history of their engagement with the agency through which the client can observe first-hand how their brand name evolves. They seek to utilize their past experience to the highest degree possible in offering their clients new solutions and managing resources internally. It is their goal and commitment to not only survive, but to continue to prosper in the advertising industry and they have turned to modern information technology in order to achieve this goal.

The design of the information system contained in this document is aimed at addressing the need of Arnold Worldwide's graphics production studio Southside to establish a framework for efficient project management and digital asset maintenance. In this design it was our goal to minimize the changes to the current system of business process established at Southside since it has proven to be adequate in maintaining the studio's operations to date.

The Current System

We have conducted several meetings with representatives from Southside and Arnold Worldwide both live and over the phone and through email questionnaires which are all outlined in the appendices. From these meetings we have come to the following understanding of the current system employed at the Southside studio.

The studio consists of a hierarchy of operators that perform the tasks involved in producing graphics for various ad campaigns. The studio is headed by the studio manager who, in addition to acting as a top level operator, carries out day-to-day administrative duties such as arrangement of supplies, archiving and backup, finances, and resource allocation. The duties and salaries of various studio employees are listed in **Appendix E**.

The studio deals with projects of various sizes and the general procedure is outlined below.

When a project is initiated the client fills out a Creative Request Form which contains details about the project at hand. For a medium sized assignment a Product Profile document is also created by the client. These documents are then forwarded to a Traffic Coordinator/Manager at the studio who decides whether the studio will be taking on this project. If the project is approved it is classified by size and a team is assigned.

For a small size project, upon approval, designers can immediately start researching or working on creative based on the CRF alone. Once the Mechanical (a file in Quark format containing the layout of the ad) is prepared by the designers, a Financial Writer performs quality control and a demo version is sent out to the client in form of a PDF file. At this point the client can either sign off or request revisions. If revisions are requested the layout goes back through the stages of design and quality control and client approval until the client finally signs off and the project is delivered.

For a medium size project, also upon approval by the manager, the CRF is forwarded to a Client Service Representative who meets with the client to determine any additional requirements that may not have been covered in the CRF. Upon the completion of this stage the CSR produces a document titled Content Outline which is then approved by

the client. The designers then can start working on producing a Mechanical. When the Mechanical is ready it goes through quality control by a Financial Writer together with the CSR to ensure brand consistency and other such issues. After Mechanical is approved a PDF version is sent out to the client, who, collaborating with the CSR, reviews the work and proposes changes. The project then goes through the stages of revision and approval until a final client sign off is received. The project is then delivered.

The following general steps can be traced throughout every project completed at the studio.

1. CRF created
2. Copywriting
3. Layout/Assembly
4. Image Manipulation
5. Proofing/Editing
6. PDF prepared
7. PDF #1 with Client
8. Client Revisions #1
9. Copy Editing
10. Assembly/Design Revisions
11. Image Retouching
12. Proofing Changes
13. PDF prepared
14. PDF #2 with Client
15. Client Revisions #2
16. ...same process as in client revisions #1
17. PDF #3 with Client
18. Client Revisions 3+(client is billed for any revisions after version 3)
19. ...same process as in client revisions #1
20. Client Approval
21. File sent out to vendor
22. Project ready for Archive

The studio uses a number of Macintosh computers which all reside on a local network together with a Microsoft Windows 2000 file server which hosts the studio's files. Designers use programs such as Quark Xpress, Adobe Photoshop, and Adobe Illustrator and Distiller to perform their tasks. Project related information is stored in folders on the file server and is tracked by a job/docket number for that project. All information from the file server is backed up onto DVD discs approximately every six weeks.

Issues in the Current System

The current system within which the studio operates suffers from many drawbacks. From our interviews with the Studio Manager and Head of the IT Department at Arnold Worldwide we have been able to identify the following problems within the current system.

The company possesses a large number of digital assets in the form of purchased image catalogues, public domain images and past project information. However, they are not able to fully take advantage of this information because they do not have a way to search and retrieve these images and documents efficiently. There is no way, for instance, to quickly produce all the images and information relating to a certain client or quickly retrieve all images that contain a 1960 Jaguar Convertible in them. Also, most files the studio deals with are high resolution production quality photos and drawings which generally take up several hundred megabytes per image and take a long time to load. For this reason considerable time is lost in searching for relevant images and projects that can be completed in a day can take up to weeks to complete.

Another related issue is that the current system relies on operating system controlled shared access folders through which designers pass data between each other. They often have several duplicates of large size images and revision history is a constant source of confusion with people working on copies of documents that are not current or simultaneously accessing an image that should not be shared.

Image copyrights are hard to enforce within the studio. Some images are licensed out to V&B on a per-viewing or per-copy basis or some other similar form of restriction. It is impossible to enforce these since there is no global repository of such images and additionally the designers enter their time sheets manually into a Filemaker database which makes it impossible to track exactly how much time do certain employees spend viewing or editing certain images.

On the level of interaction with the client the company falls short of the mark in terms of professionalism in work since all information is readied and relayed to the client manually who is also forced to follow the same conventions which badly reflects on the company and the standard of service they provide.

The studio lacks a unified project workflow system that sets up a universal protocol to be followed during the production and approval process of advertising campaigns.

Below we describe the problem as it falls within the **P.I.E.C.E.S.** framework.

Performance – While the current mode of operation allows for successful completion of projects it is by no means optimal. CSRs often find themselves having to push back deadlines because of problems with finding necessary assets and preparing work for client reviews. The large amount of manual processing and preparation lower the studio throughput considerably. Inability to meet deadlines has a very adverse affect on the company's image and results in lower overall revenue due to project pitches that are lost to competition.

Information – This is a category which is most lacking in the studio at Arnold Worldwide. It is impossible for the Studio Manager to properly track employees' performance on various projects in order to improve resource allocation. It is a constant hassle for designers and project leaders together to search out the assets they need in the huge pool of information that they control. There were instances when the company went out and bought an image which contained something that the company already owned a copy of. It is a huge waste of time to search for and retrieve a huge production quality image only to find out that a different one is required.

Economy – The lack of a unified system for control, storage and search of the massive legacy of digital assets that the company possesses makes it very hard for the company to offer solutions to the client that are competitive on the advertising market with respect to time and cost. Not only does the company lose out the business they do not get because of the quality of service they provide but they also lose a considerable amount of money because they spend extra time completing existing projects which could be dedicated to completing a larger number of projects if efficiency was increased.

Control – The company, at present, has no way to effectively enforce copyright restrictions placed on them by the vendors of the digital assets that they deal with. There is no version control system in place and it is impossible to track revision history within a project. The integrity of the data within a project folder relies on the ability of the team to keep track of a multitude of files that are often spread out

over several computers. In fact, it is only the final Quark layout file that bears the docket number in its name and no other image related to the project can be associated with that project by name alone.

Efficiency - Because of the lack of a universal protocol for handling various stages of the project there are several bottlenecks in any typical instance of any such project. For instance, a client does not have the ability to electronically annotate or sign off on a PDF version of a document. Instead they are required to hold live meetings with client service representatives to discuss existing issues who, in turn, go back to actual designers and relay those issues to them. The time required to search and retrieve assets is also a big concern. The studio used to employ a different job numbering system several years ago and retrieving any information from that period is extremely difficult. Sometimes retrieval of a particular image can take up to days even if all the necessary information about that image is present. In other cases, retrieval of an image that should only take several minutes is extended to several hours. And it is virtually impossible for someone to view all images related to a certain client or group of clients or a particular group of ad campaigns. Also, because of the lack of a version control system it is not entirely impossible for someone to overwrite a more recent image with an older copy potentially costing the company days or even weeks of work.

Services - The current setup at the studio makes it very hard to significantly increase the number of staff and the size of the projects the staff can undertake. Success of projects relies heavily on intercommunication between various team members which often occurs over unofficial channels. There are a very limited number of documents that are generated which relate to a project and it is in general difficult to closely trace a project through all its phases. Such internal shortcomings are sure to come through in the quality of work that the company produces and affect the number of contracts that the company receives. These shortcomings often make it simply impossible for the company to undertake certain rush projects which are known to generate the highest revenue due to the constrained timeline involved since the time required to produce the necessary assets eliminates the company from the list of possible contractors.

Objectives of the New System

According to the Studio Manager at Southside the main objectives of the proposed system are:

- To significantly reduce the time involved in searching and retrieving digital assets relevant to a project in progress with ability to search for data through user defined/or automatically extracted keywords.
- To ensure data integrity within a project including elimination of storage of redundant information and introduction of revision history (version control) within the project document hierarchy.
- To provide a better copyright protection for digital assets owned by the company.
- To automate the task of tracking various resources as they work on projects in order to improve client billing and resource management within the company.
- To establish a global project workflow system that will automate the business process to the greatest extent possible in order to provide the clients with the highest degree of service.

The system needs to be highly modular, platform independent, easily extendable and scalable. It needs to fall within the economic constraints defined by the management, seamlessly integrate within the current business process and be easy to learn and use.

Summary of Possible Solutions

Alternative 1 – Canto Cumulus:

Cumulus is a Digital Asset Management System developed by Canto. Cumulus offers powerful search capabilities and access via the Internet. It catalogs all files, builds thumbnail previews, and maintains detailed information about each asset.

The Cumulus product line uses a modular architecture. Optional Modules are offered by Canto at extra cost and can be added to the Cumulus core at any time. Some of the options that may be of interest to Arnold Worldwide are Cumulus Vault (Version Control System), Web Publisher (Web access to the Catalog) and Database Connector. Cumulus can also be expanded by integration of components developed by a third-party company, specifically by MediaBin. Although Cumulus provides some degree of expansion, it is still limited to the choice of products developed by Canto or MediaBin. Installation of the Cumulus DAM System, limits the company to using the options and components developed exclusively by Canto or its associates.

Cumulus is a client/server solution. The front-end of a Cumulus system is the Cumulus Client. This interface is all that a user sees. Cumulus Client operates on both Mac OS and Windows platforms and directly communicates with the Server.

Integration of the Cumulus DAM System requires installation of an SQL Server and the Cumulus SQL connect module.

The projected costs of employing this alternative are outlined below.

<i>Description</i>	<i>Cost</i>
Canto Cumulus Workgroup Edition	\$5000
Cumulus SQL connect module	\$3000
SQL server(enterprise edition)	\$19900
Client licenses for 50 users \$295 per license.	\$8850

Description	Cost
Deployment Server (PC-compatible, dual processor, raid and etc)	\$8500
Supporting Software	\$3500
Total:	\$48750

Figure 1 – Canto Cumulus Software and Hardware Costs.

Description	Cost
Technical support contract	\$4000
Server software and hardware maintenance Estimated 150 hours for 1 employee at \$20/hour. <i>Note: Maintenance will be performed by the in-house group of programmers.</i>	\$3000
Total:	\$7000

Figure 2 – Canto Cumulus Annual Operation Costs.

Description	Cost
System Setup and training, contract, \$1500/day for 2 days. <i>Note: Setup will be performed by the manufacturer support personnel</i>	\$3000
Employee training on how to use the system. Estimated 15 hours of training for 30 employees at average wage rate of \$25/hour. Contract for training services with manufacturer of the software for \$3000. <i>Note: Employees will be paid their existing hourly wage during training.</i>	\$11250

Description	Cost
Import of the existing assets into the new digital asset management system.	
Estimated 150 hours 1 employee at \$20/hour.	\$3000
Total:	\$17250

Figure 3 – Canto Cumulus Other Expenses.

Total estimated cost of employing Cumulus Canto is **\$48750 + \$17250 = \$66000.**

Total estimated annual operating costs for employing Cumulus Canto are **\$7000.**

Alternative 2 – Documentum:

The Documentum Digital Asset Management system was chosen as a possible solution for several reasons, including a long history in the market, standardized architecture, modularity, and ease of use. The system received outstanding reviews from both its clients and research groups involved in DAM system research, review and analysis.

Documentum DAM system is based on a system Two.Four initially developed by the Bulldog Group, Toronto. For several years Bulldog has been a market leader in digital asset management with an easy to use, scalable system that was successfully employed at a number of large corporations. When Bulldog was bought out by Documentum they incorporated the older Two.Four system into a newer solution which offers an extended set of features and takes advantage of some of the recently established standards in software development and compatibility.

Documentum is based on the J2EE technology and consists of several modules which act as add-ons onto a global framework. The global framework offers a content repository with storage and retrieval capabilities while other modules include a Digital Asset Management system, a project Workflow System, a Content Delivery system, and several others. The framework is designed to be compatible with any 3rd party modules that follow the J2EE and ODBC standards.

In terms of the system's utility to Vickers & Benson the system offers a range of features that completely fulfill the current requirements of the management and employees at the studio. The framework and DAM can be implemented as Phase 1 of the multi phase project that the management at Southside has in mind in order to establish a global project management system. Once these modules are fully installed and integrated, and once the employees have gotten used to utilizing the new system a workflow component may be added as well as any other components that the management may desire at that time. This gradual process of implementation of the system will ensure that the studio will suffer no considerable slow-downs in its business process as the employees will be introduced to the system in, easy to master, parts.

Documentum offers a wide range of technical support and training options which include 24 hour support service and on-site maintenance and training. The company has a large office in Toronto, Canada and thus trained Documentum personnel will always be at Southside's disposal if something goes wrong.

The projected costs of employing Documentum are outlined below.

<i>Description</i>	<i>Cost</i>
Documentum Foundation Licenses at \$600/license * 30 users	\$18000
Documentum DAM at \$1700/license * 30 users	\$51000
Deployment Server (PC-compatible, dual processor, raid and etc)	\$8500
Supporting Software	\$3500
Total:	\$81000

Figure 4 – Documentum Software and Hardware Costs.

Description	Cost
Project support / maintenance Estimated 125 hours for 2 employers at \$20/hour. <i>Note: Maintenance will be performed by the in-house group of programmers.</i>	\$5000
Server software and hardware maintenance Estimated 150 hours for 1 employee at \$20/hour. <i>Note: Maintenance will be performed by the in-house group of programmers.</i>	\$3000
Total:	\$8000

Figure 5 – Documentum Annual Operating Costs.

Description	Cost
Customization of system for local needs, contract. <i>Note: Customization will be performed by the manufacturer support personnel</i>	\$12000
Employee training on how to use the system. Estimated 15 hours of training for 30 employers at average wage rate of \$25/hour. Contract for training services with manufacturer of the software for \$4000. <i>Note: Employees will be paid their existing hourly wage during training.</i>	\$15250
Import of the existing assets into the new digital asset management system. Estimated 150 hours 1 employee at \$20/hour.	\$3000
Total:	\$30250

Figure 6 – Documentum Other Expenses.

Total estimated cost of employing Documentum is **\$81000 + \$30250 = \$112500.**

Total estimated annual operating costs for employing Documentum are **\$8000.**

Alternative 3 – In-House Development:

The development of the information system in question in-house is a viable solution because Arnold Worldwide, Toronto has at its disposal Arnold Interactive which is a subdivision that specializes in producing e-commerce websites.

The group consists of four developers and two project managers who possess considerable experience in developing e-commerce solutions for the web.

If the information system is developed in-house, Southside will be guaranteed to receive a solution that closely addresses their needs and concerns. The developers at Arnold Interactive collaborate with Southside on a day-to-day basis and are familiar with the business process at the studio. They know the designers at the studio on a personal level and will be able to develop the system with constant feedback from the people that will use the system later.

An out-of-the-box solution might contain a richer feature set and boast the newest technologies but is in no way guaranteed to meet the needs of the studio. Arnold Worldwide has evolved as a company over nearly 80 years and they have a very established business process within the studio. A purchased solution will necessarily force the studio to change the way they function in many ways which is undesirable since studio operator functionality is likely to suffer. At the extreme, some studio employees may refuse to use the system altogether if it fails to address their needs or is overly complicated to use.

All of this can be avoided by developing the system in-house since the system can be designed and built around the current business process at the studio. This will minimize the initial designer efficiency plunge, will ensure that studio employees actually use the system, and like using the system, as well as address every major concern within the current system to the highest degree possible.

Additionally the agency will save money by keeping the project internal and will have support staff on site at all times as Arnold Interactive is located in the same building as Southside. The agency will not need to rely on the product vendor to develop patches for bugs or inconsistencies. Instead the system may be fine tuned by the

developers in the initial stages of its employment and additional modules may be developed at any time with any desired functionality.

The agency could even turn around and sell the information system for other agencies to employ.

The projected costs of developing an in-house solution are outlined below.

Personnel:

#	Job Description	Wage rate (dollars per hour)	Workload (hours)	Cost
1	Project manager	\$50	280	\$14000
2	System Analyst/Architect	\$40	150	\$12000
1	Technical consultant	\$45	280	\$12600
4	Programmer(from existing group)	\$20	280	\$22400
1	GUI Designer (from existing group)	\$20	100	\$2000
2	Beta tester (from existing group)	\$20	100	\$4000
1	Technical writer(from existing group)	\$20	100	\$2000
	Total:			\$69000

Figure 7 – In-House Solution Personnel Costs.

Description	Cost
SQL Server (enterprise version)	\$19900
Total:	\$19900

Figure 8 – In-House Solution Software and Hardware Costs.

Description	Cost
Upgrade of existing skills for the existing programmer group. Estimated 20 hours of training for 5 employers at \$20/hour.	\$2000
Employee training on how to use the system. Estimated 15 hours of training for 30 employers at average wage rate of \$25/hour. <i>Note: Employees will be paid their existing hourly wage during training.</i>	\$11250
Import of the existing assets into the new digital asset management system. Estimated 10 hours 1 employee at \$20/hour.	\$200
Total:	\$13450

Figure 9 – In-House Solution Other Expenses.

Total estimated cost of developing an in-house solution is **\$69000 + \$19900 + \$13450 = \$102350**.

Alternative 4 – Carey Digital Asset Management System:

The CareyDAM system has caught our interest as it is an unusual solution to the Digital Asset Management challenge. While most companies offer product packages that are installed directly on-site and run off client owned hardware Carey offers an entirely different solution.

Instead of selling an actual software solution the CareyDAM provides a service. All digital assets are hosted on the CareyDAM servers and maintained by their operators. The assets are available for browsing online. The system offers all the same types of features that regular DAM solutions provide excepting those that require the files to actually be stored on the company servers. The main benefit of the system lies in the fact that the clients do not have to concern themselves with integration and maintenance of the system instead they pay a monthly service fee for hosting and system usage.

The projected costs of employing the Carey DAM system are outlined below.

Description	Rate	Cost
Network connection setup fee: fractional T3, 9Mbps	Fixed cost	\$4500
Network connection monthly fee: fractional T3, 9Mbps	\$9000/month	\$108000
Service access fee	\$6000/month	\$72000
Employee training on how to use the system. Estimated 15 hours of training for 30 employers at average wage rate of \$20/hour. <i>Note: Employees will be paid their existing hourly wage during training.</i>	Fixed cost	\$8550
Total:		\$193050

Figure 10 – Carey DAM System Operating Costs.

Chosen Solution:

Through meetings with the client and careful analysis at the feasibility study stages of the project we have come to the conclusion that it is in the company's best interest to develop the system in-house.

At a cost of just over \$100k Arnold Worldwide is ensured to receive a system that will be custom tailored to the needs of the studio, will be developed with an in-depth understanding of the current business process, will operate on existing hardware infrastructure, will fully belong to the company, with available source code, and will be delivered within a two month period.

The management at Arnold Worldwide is confident that the system developed by Arnold Interactive will be at the very least comparable to the systems currently available on the market and will be cost-effective especially given the agency's long term goals of establishing the system as a company-wide framework for project management since additional licenses for the system can be obtained at no cost and new modules for the system can be developed on an ongoing basis as the need for them arises.

System Architecture

The current hardware and software infrastructure at Southside is sufficient for the deployment of the new information system except for several items. Both the existing structure and the items that need to be purchased for successful system deployment are listed below.

Existing Structure:

Networking

Bell ATM 90 Mbps dedicated LAN.

This is a company-wide LAN that includes all the departments at the 1920 Yonge st. office. The existence of this single LAN offers great opportunities for system expansion into other departments.

Servers

Windows 2000 2 GHz dual, 2 GB DDR SDRAM, Telex RAID 8-560 560 GB RAID array – File Server.

This server hosts shared files for studio usage.

Windows 2000 IIS 5, 2 GHz dual, 2 GB DDR SDRAM, 250 GB Western Digital Caviar® Special Edition – Web Server.

This server is used to host web sites for Arnold Interactive.

Clients

Power Mac G4 Dual 1.42GHz w/2MB L3 per proc.
2.0GB DDR333 SDRAM (PC2700) - 4 DIMMs,
120GB Ultra ATA drive,
Apple SuperDrive,
ATI Radeon 9700 Pro w/128MB DDR,
Mac OS X

32 units are installed at Southside.

AMD Athlon XP 2700+ @ 333MHz FSB,
1 GB DDR SDRAM PC2700,
80 GB Seagate Barracuda,
ATI Radeon 9700 128Mb DDR
Windows 2000 Professional.

6 units are installed at Southside.

Additional Required Hardware and Software:

Servers

Windows 2000 2 GHz dual,
2 GB DDR SDRAM,
250 GB Western Digital Caviar® Special Edition.

This machine is to act as a Web Server and Application Server.

Windows 2000 2 GHz dual,
2 GB DDR SDRAM,
Telex RAID 6-400 400Gb RAID array.

This machine is to act as a Database Server.

Software

Macromedia JRun 4 - \$899 USD

This software is to act as a server for the servlets that constitute the bulk of the information system.

Microsoft SQL Server 2000 Enterprise Edition - \$19,900 USD

This database will be responsible for the database component of the information system.

Software Architecture

The logical system decomposition is presented in Appendix B. Physically, the system will follow a 5-tier architecture consisting of a File Server, a Database Server, a Web Server, an Application Server, and Clients.

The Web Server and the Application Server will reside on the same machine and will consist of a Macromedia JRun 4 installation. This machine will interface interactions between the Clients and the File and Database Servers.

The File Server will take on the functionality of the CVS and Data Repository logical subsystems. All digital assets as well as project files will be stored on the File Server. The File Server will be transparent to the client in that all the transactions that deal with accessing the File Server will take place through the Application Server. Locations of various files that are stored on the File Server will be contained in the database.

The Database Server will house an installation of Microsoft SQL Server 2000 Enterprise Edition. The database will store several types of information that are vital to the information system. The database will contain information about the users of the system and their roles within the company. The database will contain information related to various projects undertaken by the studio including information on clients, project administrative documents, project creative documents, staff assigned to various projects, tasks to be undertaken by the staff, and information on client revisions to various creative work performed. The database will also contain locations for all the files on the File Server that are part of the information system.

The Clients of the system can be broken down into four groups. The Administrators are responsible for the general upkeep of the system as well as creation and removal of new users and import of digital asset libraries into the system. The Managers hold senior positions in the studio are responsible for managing various projects within the system. The Designers carry out various project-related tasks that involve creating digital media. The Clients use the system as a portal to carry out revision and approval process for various projects they are engaged in.

As a whole, the system will act as a database-driven website that provides a project and digital asset management framework to the studio.

In terms of a digital asset library the system will offer an advanced search tool that will enable system users to query the library of digital assets stored within the system based on various search criteria such as clients, formats, projects, and keywords. This tool will be available to managers and designers at all times as it is central to their work on various projects. The system will provide an interface for importing new assets as they are acquired. Assets are not tied to a particular file format but can rather be any type of file that is of value to the studio. These files will be mostly still digital images that are both created by the studio and purchased from third parties.

The project management component of the system will enable the studio to carry out its projects in a uniform and standardized fashion. This will allow for extensive tracking and analyses to be performed in order to improve internal resource management as well as offer clients better advertising strategies based on past interactions with these clients or similar campaigns undertaken by other clients.

Each user of the system will be issued a userID and password that will identify them to the system. The system will then present the user with an interface that reflects that user's role within the system.

The managers will have a list of their active projects displayed. The managers have the ability to initiate a new project or work with any of the active projects they are assigned to. For an existing project a manager can add or remove various staff to and from that project. The manager can identify and create tasks for various staff assigned to that project to complete. The manager can also perform quality control on tasks that are already completed.

The exchange of tasks between a manager and the designers is facilitated through a project queue. A queue exists for each project such that one end of the queue belongs to the manager for that project and an end exists for each designer that is assigned to that project. The manager uses the queue to send tasks to various designers. The designers, upon completion of their tasks, send these tasks back to the manager via the project queue for quality control.

No work on a project by a designer can take place outside of a task living in that project's queue for that particular designer. This

approach ensures that all work that is carried out at the studio can be tracked and recorded.

The manager has the ability to send completed work for the client to approve. Depending on whether the work is approved the manager can either close the project and tag it as completed or can initiate a number of new tasks that reflect the client's revisions.

The client's interface to the system consists of a listing of batches of files that were delivered and are organized by projects. For each such batch, the client can view all the files contained in that batch and either approve or reject each file. For any file that the client rejects, the client can supply additional comments and revisions that are to be made to that file. This way, the majority of the client revision process can be tracked and recorded.

The designer's interface to the system consists of a list of pending tasks for that designer to complete on the projects she is assigned to. Each task will contain instructions and relevant files that are needed to complete the task. The designer, upon completion of any task, can send the task back to the project manager for the purpose of quality control.

Both the designers and the managers make extensive use of the CVS contained in the system. This module is available to them at all times. All work on project files takes place through the CVS. A user can browse through project files contained in the CVS and either create a new file or folder or choose to work on an existing file. In either case the user will check out the file and a local copy will be created on their hard drive. When the work on that file is completed the user can check the file back into the CVS. This sub-system deals with issues of concurrent access and versioning within the system.

As a whole, the system enables the studio to carry out their projects in a consistent manner. It also allows the system users to take advantage of a rich legacy of company digital assets and offer to their clients a unique client revision process that takes place over the internet.

The decision to use this particular architecture was heavily influenced by the studio managements wishes as described in Appendix N. This architecture is consistent with designs of similar products created by industry leaders in project and digital asset management including Canto, Documentum, and IBM Informix.

Program Design

In this section, the DAMS system is described in terms of various types of diagrams.

Class Diagrams

Please see APPENDIX

Sequence Diagrams

Please see APPENDIX

Statechart Diagrams

Please see APPENDIX

Database Design

A good design of the Database is essential to our system. A DBMS will provide our system with the following capabilities:

1. It will support the storage of very large amounts of asset information. It will support efficient access to very large amounts of data via indexing.
2. It will allow our system to access and modify data through a query language.

The **Entity-Relationship** diagram in **APPENDIX I**, describes the data that will be stored in our database, modeling it through the use of entities and relationship.

The **Data Dictionary** in **APPENDIX J**, provides a more detailed description of the entities and relationships used in the ER diagram. Moreover, the data dictionary provides a formal overview of the objects that make up our system and the relationships between them.

Transformation from ER to Schema

The ER diagram is a good basis for a **Database Schema** design. With the help of transformation rules presented to us in the lecture slides the information modeled by the ER diagrams can be transformed into a

database schema. A step by step transformation process is presented below.

Relationship: Work relationship between Designer and Project is a many-to-many relationship.

Translation:

Designer (userID)

Project (projectID, name, startDate, deadline)

Work (userID, projectID)

Notes: The Designer table is useless, since it duplicates the information from the User table, therefore it will not be included in the schema.

Relationship: Management relationship between Manager and Project is a one-to-many relationship with mandatory participation.

Translation:

Manager (userID)

Project (projectID, name, startDate, deadline, userID)

Notes:

- The Manager table is useless, since it duplicates the information from the User table, therefore it will not be included in the schema.
- A constraint will have to be added to the schema saying that the User with userID in the Project relation must be a Manager.

Relationship: Request relationship between Client and Project is a one-to-many relationship with mandatory participation.

Translation:

Client (userID, contactName, address, phone, email)

Project (projectID, name, startDate, deadline, managerID, clientID)

Relationship: Belongs relationship between Queue and Project is a one-to-one relationship with mandatory participation for both entities.

Translation:

Queue (queueID, projectID)

Project (projectID, name, startDate, deadline, managerID, clientID)

Relationship: QueueContents relationship between Queue and Task is a one-to-many relationship with mandatory participation.

Translation:

Queue (queueID, projectID)

Task (taskID, priority, deadline, status, description, queueID)

Relationship: Location relationship between Project and ProjectFolder one-to-one relationship with mandatory participation for both sides.

Translation:

Project (projectID, name, startDate, deadline, managerID, clientID)
ProjectFolder (fullPath, projectID)

Relationship: ProjectContents relationship between ProjectFolder and CVSFile is a one-to-many relationship with mandatory participation.

Translation:

ProjectFolder (fullPath, projectID)
CVSFile (fileID, name, creationDate, isFolder, projectFolder)
where ProjectFolder.fullPath = CVSFile.projectFolder

Relationship: FolderContents relationship between CVSFile (where CVSFile.isFolder) and CVSFile (where not CVSFile.isFolder) is one-to-many with mandatory participation.

Translation:

CVSFile (fileID, parentID, name, creationDate, isFolder, projectFolder)

Notes:

- When CVSFile1.isFolder = True, then parentID is referencing CVSFile2 where CVSFile2.isFolder = False.
- When CVSFile.isFolder = False then parentID = NULL and folderPath = NULL
- A constraint will have to be added to the schema to reflect this.

Relationship: Has relationship between CVSFile and Version is a relationship with an external identifier.

Translation:

CVSFile (fileID, parentID, creationDate, isFolder, projectFolder)
Version (fileID, number, date, comments, userDetailsStamp)

Notes:

A Version is identified by the identifier (a primary key) of a CVSFile and by the number attribute.

Relationship: Conversion relationship between Version and Deliverable is a many-to-many relationship.

Translation:

Version (fileID, number, date, comments, userDetailsStamp)
Deliverable (delivID, delivDate)
Conversion (fileID, number, delivID)

Relationship: Revision relationship between Client and Deliverable is a one-to-many relationship with mandatory participation.

Translation:

Client (userID, contactName, address, phone, email)

Deliverable (delivID, delivDate, userID)

Resulting Schema

Thus, from the translation above, it can be seen that the **Database Schema** will have the following tables and attributes:

User (userID, name, password)

Designer (designerID)

where Designer.designerID references User.userID

Manager (managerID)

where Manager.managerID references User.userID

Work (designerID, projectID)

where Work.projectID references Project.projectID

Client (clientID, contactName, address, phone, email)

where Client.clientID references User.userID

Project (projectID, name, startDate, deadline, managerID, clientID)

where Project.clientID references Client.clientID

and Project.managerID references Manager.managerID

Queue (queueID, projectID)

where Queue.projectID references Project.projectID

Task (taskID, priority, deadline, status, description, queueID)

where Task.queueID references Queue.queueID

ProjectFolder (fullPath, projectID)

where ProjectFolder.projectID references Project.projectID

CVSFile (fileID, parentID, creationDate, isFolder, projectFolder)

where CVSFile.parentID references CVSFile.fileID

where CVSFile.projectFolder references ProjectFolder.fullPath

Version (fileID, number, date, comments, userDetailsStamp)

where Version.fileID references CVSFile.fileID

Conversion (fileID, number, delivID)

*where Conversion.fileID references Version.fileID
and Conversion.number references Version.number
and delivID.number references Deliverable.delivID*

Deliverable (delivID, delivDate, clientID)
where Deliverable.clientID references Client.clientID

Schema Revision and Generalization

In the above schema, there are two useless tables, namely the Designer and the Manager tables. They duplicate data from the User table and thus will have to be removed from the schema. These two tables will be replaced by one table Employer(employerID, isManager) where Employer.employerID references User.userID and isManager is a flag that will be set to true if the user with this userID is a Manager and to false if the user with this userID is a designer.

Attributes in other tables that reference either of the clientID or the managerID will accordingly be updated to reference Employer.employerID .

Note that we decide to keep the User generalization of the Client and the Employee tables.

Load of the System

The system is designated for a designer studio where the number of people currently employed does not exceed 30. The users of our system are mostly the designers themselves, the managers and the clients. Clients will not be using the system very extensively, so the primary users are the people working in the studio.

Therefore, since the upper bound on the number of users accessing the system at any given time is about 50, the workload will not be significant.

This means that it will not affect our relational schema design.

Final Database Schema and a DDL File

Please see **APPENDIX K** for a DAMS.ddl file that contains SQL statements to create the schema discussed above. Note that this file describes the schema in a much greater detail than the statements above. Apart from the table names, their attributes, and their primary keys it reveals details about the types and the sizes of the attributes. Even more importantly, it defines some constraints for the data.

Here are the types of constraints the schema in **APPENDIX K** contains:

Constraint Type: Single-value constraint

Notes: This requires that a value of a particular attribute is unique. The primary keys in all the relationships are defined to be unique.

Constraint Type: Referential integrity constraint

Notes: This requires that values in the referencing table must match values in the referenced table. A foreign key is a referential integrity constraint and almost every table in our schema has a foreign key.

Constraint Type: Domain constraints

Notes: Check constraints are domain constraints. One domain constraint used in our schema is a check constraint in our Task table that checks for the domain of the status attribute.

Constraint Type: Other constraints

Notes: other constraints will be implemented through the declaration of assertions and triggers.

Other constraints are:

- A constraint on the Project table: Project.managerID references Employee.employeeID where Employee.isManager = TRUE
- A constraint on the Work table: Work.designerID references Employee.employeeID where Employee.isManager = FALSE
- A constraint on the Project table:
 - Project.startDate < Project.deadline
- A constraint on the CVSFile table: CVSFile.parentID references CVSFile2.fileID and when CVSFile.parentID is not null then CVSFile2.isFolder is TRUE
- A constraint on the Version table: Version.fileID references CVSFile.fileID where CVSFile.isFolder must be FALSE.

Normalization of the Relational Schema

Our relational schema is in 1NF since none of the relations in it includes any multi-valued attributes.

Our relational schema is in 2NF since in all of the relations all non-key attributes depend on all elements of this relation's key. In all of the relations except one, the primary key is only one attribute, and all other attributes depend on this unique key.

Our relational schema is in 3NF since none of its non key attributes depends on any other non key attribute. That is, we know a relation is in 3NF if all the attributes are fully dependent upon the primary key. In all our relations, this is exactly the case. This is mostly because we are using an integer unique Identifier to identify the tuples.

Classes and Class Diagram

Please refer to **APPENDIX L** to see the Class Diagram.

Entity Relationship modeling and class representation are closely related.

The following classes can be used for the system implementation:

```
User{
    //Attributes
    Integer userID
    String name
    String password

    //Methods
    User(Integer userID);
    static User login(Integer userID, String password);
    void logout();
}

Manager extends User{
    //Attributes
    Project[] projects;

    //Methods
    Project createProject(){
        // Updates database with new project record.
        // Creates new project instance with projected
        // from database.
        // For all designers calls Project.addDesigner();
        // returns project instance.
    }

    Project[] getProjects();
    void deliverFiles(Integer clientID, Version[] files);
}

Client extends User {
    //Attributes
    String contactName
```

```

    String address
    String phone
    String email
    Project[] projects;

    //Methods
    Deliverable[] listDeliverables();
    approve(Version version);
    reject(Version version, String comment);
}

Designer extends User{
    //Attributes
    Project[] projects;

    //Methods
    Project[] getProjects();
    ProjectFolder getCVSFolder();
}

Project{
    //Attributes
    Integer projectID;
    Client client;
    Manager manager;
    String name;
    Date startDate;
    String cvsPath;
    Queue queue;

    //Methods
    Project(Integer projectId);
    addDesigner(Designer designer){
        // add designer to this project;
    }
    removeDesigner(Designer designer){
        // remove designer from project;
    }

    Designer[] getDesigners();

    CVSFile getFiles() {
        // returns the files and folders stored in the
        // CVS under this project id
    }
}

```

```

        close();
    }

    Queue{
        //Attributes
        Integer queueID
        Task[] tasks;

        //Methods
        getTasks(Integer userID)
    }

    Task{
        //Attributes
        Integer taskID
        String description
        Integer priority
    }

    CVSFile {
        //Attributes
        Integer fileID
        Date creationDate
        String name

        //Methods
        bool isFolder()
        addVersion()
        CVSFile[] getFiles() {
            // Pre: this object is a folder
            // returns the list of files in this folder
        }
        Versions[] getVersions() {
            // Pre: this object is a file
            // returns the list of versions
        }

        delete();
    }

    Version {
        //Attributes

        //Methods
        String getUrl();
    }

```

```

        Int getVersion();
        delete();
    }

    Deliverable{
        // Attributes
        Integer deliverableID;
        Version[] files;
        Date deliveryDate;
        Integer clientID;
        String comments;

        // Methods
        Deliverable(Integer clientID)
        void deliver();
        addVersion(Version version);
        removeVersion(Version version);
    }

    Asset{
        // Attributes
        Integer assetID
        String name
        String path
        String metadata
        Date creationDate
        String thumbnail

        // Methods
        Asset()
        import();
    }

```

GUI Design

There are three primary groups of people who are going to use the system: Managers, Designers and Clients. Manager is required to have more advanced knowledge of computers. Person acting as a Manager also acts as Admin. GUI for Designer and Client is intentionally kept simple and user friendly.

Each user logs into the system through the Login page. Data transmission to the Login page is protected by the SSL protocol. System identifies the user and presents him with a different main page depending on his security permission. For example only users with type manager can see Manager's GUI.

Description of mockup windows

Please see **APPENDIX G** for GUI screen mockups.

Login Screen

Whenever user wants to use system functionality he has to authenticate himself to the system. User goes to the login screen, enters his numeric user id and a password and clicks login button. After user identity is confirmed by the system, he is redirected to the main system screen. User is presented with one of four different main screens depending on the user type.

Manager's Main Screen

When Manager logs into the system he is presented with this screen. Here he can open a project from the list, which is located on the left panel.

Manager's Admin Screen

On this screen Manager can assign Designers to the project in a convenient and efficient manner. A list of the available designers is located on the left and a list of the assigned designers is located on the right. In order to assign the designer to the project Manager selects him in the available designer list, and clicks ">" button, at this time designer appears in the assigned designers list.

If there are no existing projects for this particular Manager then Admin is the default screen, which appears after login. Otherwise Queue In is default. Manager creates a project by clicking on the Create Project button, which opens Create Project Screen. Close project button opens Close Project screen where Manager can select which files from the project will be added to the Repository.

Manager's Create Project Screen

This screen is opened from the Manager's Admin Screen. When user creates project he selects a client and a group of designers to work on the project and enters a project name. Manager can only select from a list of existing Clients and Designers, which can be entered in to the system by the Admin.

Manager's Queue In

If Manager has already created one or more projects then Queue In will be displayed by default. On this page Manager can browse tasks returned from the designers. For example when designer completes a task and requests designers approval, the task goes into the Manager's Queue In. Manager can edit a task by clicking on the task link, which opens Edit Task Screen. Alternatively manager can create a New Task by clicking New Task Button, which opens New Task Screen.

Manager's Queue Out

Managers Queue Out contains a list of tasks which have been assigned to the Designers and which have not yet been returned to the Manager. Manager can cancel a task by going to the Edit Task Screen and changing task status to Canceled. Alternatively Manager can create a new task by clicking the New Task Button.

Manager's New Task Screen

New Task Screen is opened from the Queue In or Queue Out screens. When manager creates a new task he selects a designer from the list of designers assigned to the project, enters task description and name. The status of the task at this time is automatically set to Initiated.

Manager's Edit Task Screen

Edit task screen is opened from the Queue In or Queue Out screens. Manager can modify task description and change status. Other fields

cannot be modified, if their modification is needed a new task must be created. If edited previous message is quoted like in email messages.

Manager's Content Delivery Screen

When Manager receives a release candidate (a "final" version of the graphics design) he sends it to the Client for approval. Usually Manager will bundle few release candidates in one batch. To send files to the Client manager adds them to the batch from the CVS system. In order to add a file manager clicks on the File in the CVS, which becomes selected and then clicks on the Add File Button. Manager can also send a short text message to the client.

Client's Main Screen

Client's Main Screen is displayed when client logs in. On the left panel client can select an approval request, which opens a list of the files to approve on the right. By default the most recent request in the first project is selected and is shown on the right panel. Client can approve or reject a file design, as well as, enter some message concerning each file, which later sent to the Manager. When client is done approving the files he clicks on the Send button.

Admin's Main Screen

Admin is responsible for maintaining user records and related information. For example contact name, email and etc are stored for the Client. On the main screen Admin can see a list of existing users, which can be edited by clicking on the link. He can also add a new user by clicking New User Button, which displayed a different new user screen depending on the client type. Admin changes user type by selecting a value from the user type drop down menu.

Admin New User Screen / Admin Edit User Screen

Both screens are exactly the same, except that when Admin clicks New User Button all the fields are empty. Admin can change user type by selecting a value from user type dropdown list. When Admin has finished editing the user he clicks OK.

Designer's Main Screen

On the designers main screen Designer can browse a list of projects that he is assigned to. Designer can select a task under a project,

which will be displayed on the right top panel. When designer has completed the task he returns it to the manager. At this time task disappears from the Designers task queue on the left.

CVS

Operation on the CVS is same for both Manager and Designer. However only mockups for Designer are presented in this document.

Designer can select Folder or Files on the CVS pane in the right bottom section of the page. The gray background distinguishes selected file or folder. User can only perform operations on a selected file.

CVS Check in / Check out

After user has selected a file he can check it in or out. When User checks in a file a standard browser open or save dialog is displayed where user can select a file to check in or a location for the file to checkout. File is transferred by standard browser means through HTTP protocol and consequentially standard browser download or upload dialogs are displayed.

CVS New File / CVS New Folder

When user creates a new file or a new folder a new file folder dialog is displayed. If there was no selected folder or file then new file or folder is added to the root folder, otherwise to the selected folder.

CVS Version

When user clicks on the selected file for the second time a View Versions Screen is displayed. Here user can browse all the versions in their historical order and check them out.

Search

Either a designer or a manager can perform repository search. Digital assets in the repository have meta-data like keywords and etc associated with them. User can specify logical conditions for the search. Results of the search are displayed in the table with an image thumbnail, file name and description. To download full sized image user just clicks on the thumbnail.

Description of State Charts

Please see **APPENDIX H** for state charts.

All the charts represent flow through the web pages of the web site. Assume that there is a transition from every leaf state to the Main state when browsing Website UI state charts.

Manger UI State chart

Manager can administer projects, assign tasks and communicate with the client to get approvals. Manager accesses Administrative functionality through the Admin button, Project Task Queue through the Queue In and Queue Out buttons, and content delivery through the Deliver buttons.

Admin UI State chart

Main function of the Admin is to add/remove users and to maintain user related information. For example user can edit client information in the Edit user screen as shown on the diagram.

Designer UI State chart

The two primary operations that Designer performs are working with the Task Queue and CVS files.

Client UI State chart

This is most basic UI, which is targeted on the broad range of users with different levels of computer literacy. Client can select a batch that contains files to be approves, browse this files and select if he approves them, or alternatively reject a file and write a comment.

Input / Output Design

Access to the application is performed only though the user friendly web site. Users use only web browser to access data. Consequentially there is no non standard input / output.

Conclusion

Along the process of the feasibility study, the requirements gathering and the system design, we were examining the needs of our users and their requirements from the system.

We came a long way from the stage where our idea about the system was very broad and the scope of the problem was fairly large to a stage where the system is well defined and its design is established. At the beginning we put a lot of emphasis on the asset management part of the system, however, while getting more familiar with the requirements from the management, we recouped our problem to concentrate more on the project management and the workflow parts of the system.

The GUI screens presented in this document (APPENDIX G) provide a walk through the system and the functionality it supports.

The ER Diagram and the relational schema provide a picture of how the data will be organized within the database (APPENDIX I, J, K).

And finally, the diagrams and the state charts give an overview of the internal interaction of the system components as well as the interaction between the clients and the system.

Most of the functionality that is summarized in the requirements' gathering document (APPENDIX N) is provided by the system designed in this document.

Below is a document that describes a work process in the studio and all the things that the users of the system will be able to do with it. Note that it quite closely relates to the requirements mentioned above.

When a project is initiated the manager sets up the directory structure for the project. A folder is created for the project on the file server and a record in the database is made also. CRF and other initial documents are stored in folder.

A manager interacts with the client upon project's initiation to establish deliverables. When some goals are

established the manager generates a number of administrative documents related to the project.

The manager assesses the resources required for project completion. Corresponding to this assessment the manager assigns a number of designers to work on the project. Designer user id's are attached to the project folder. This gives them access to the files related to the project.

For each designer that is assigned to a project a task queue is generated for that project. Each task queue facilitates interaction between the manager and the designer the queue belongs to.

The manager breaks down the project into tasks to be completed by various designers.

For each task the manager defines what files need to be created/edited and what particular work needs to be done as well as documents to be referenced and an expected completion time. When a task is defined the manager places the task in a designer's queue.

Each morning a designer logs into the system and the system makes her aware of the pending tasks within that designer's queue.

The designer works on the task that she is booked on for that day.

The designer signs out a copy of the file she needs to work on from the version control system. As a result a copy of the file is created on her local hard-drive for her to work on.

Periodically the designer commits the file she is working on to the version control system.

When she completes the work she sends the task back to the manager for approval.

The manager reviews the work and either terminates the task by flagging it as "completed" or sends the task back to the designer with additional requirements or changes.

This cycle carries on until the manager is satisfied with the work and tags the task as "completed".

When a sufficient amount of work is completed it is presented to the client for revision.

The manager selects the files to be delivered to the client and they are placed in that client's area within the system. A client is sent an email notification that work is available for them to review.

The client logs on to the system with their userID and password and is presented with the delivered files.

The client can review the files and either sign off or request changes be made. If the client wants changes she has the option of attaching various documents explaining the changes and sending the files back to the company.

If client revisions are requested the manager upon receipt of these generates a new set of tasks for the designers.

The client revision process carries on until a sign off from the client is obtained.

At this point the project is considered to be completed.

Upon the completion of a project the final versions of the images are sent to the relevant print shop. The manager also selects a number of image files and administrative documents and imports them into the data repository as assets. All project files are placed in the backup directory and the project is removed from the active projects folder.

At any point during this process the managers or designers consult the data repository for relevant images or documents. If they need to edit a document for their use they request a copy be made on their local machine.

Appendix A – Data Flow Diagram

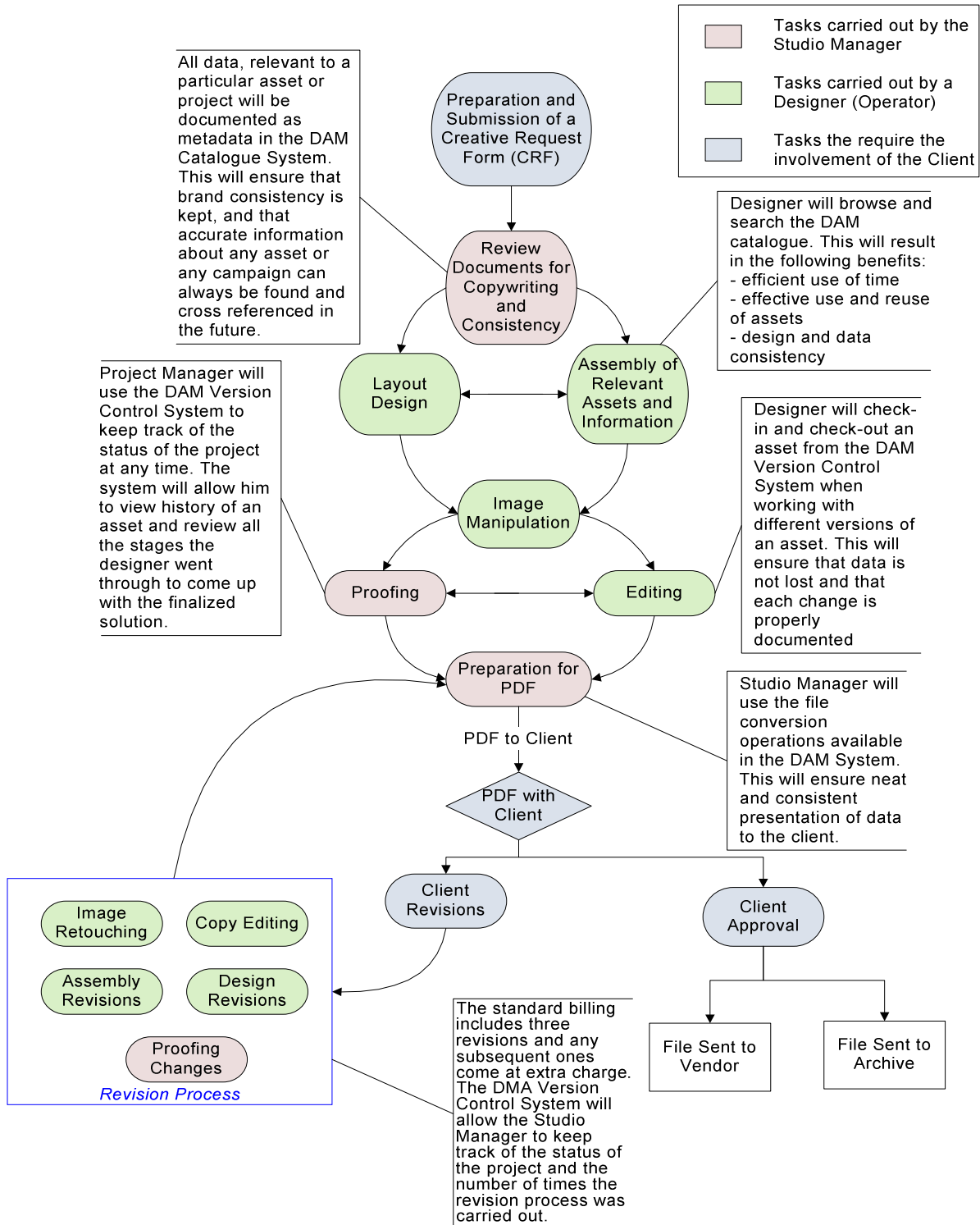


Figure A.1 – Southside Project Data Flow.

Appendix B – System Decomposition

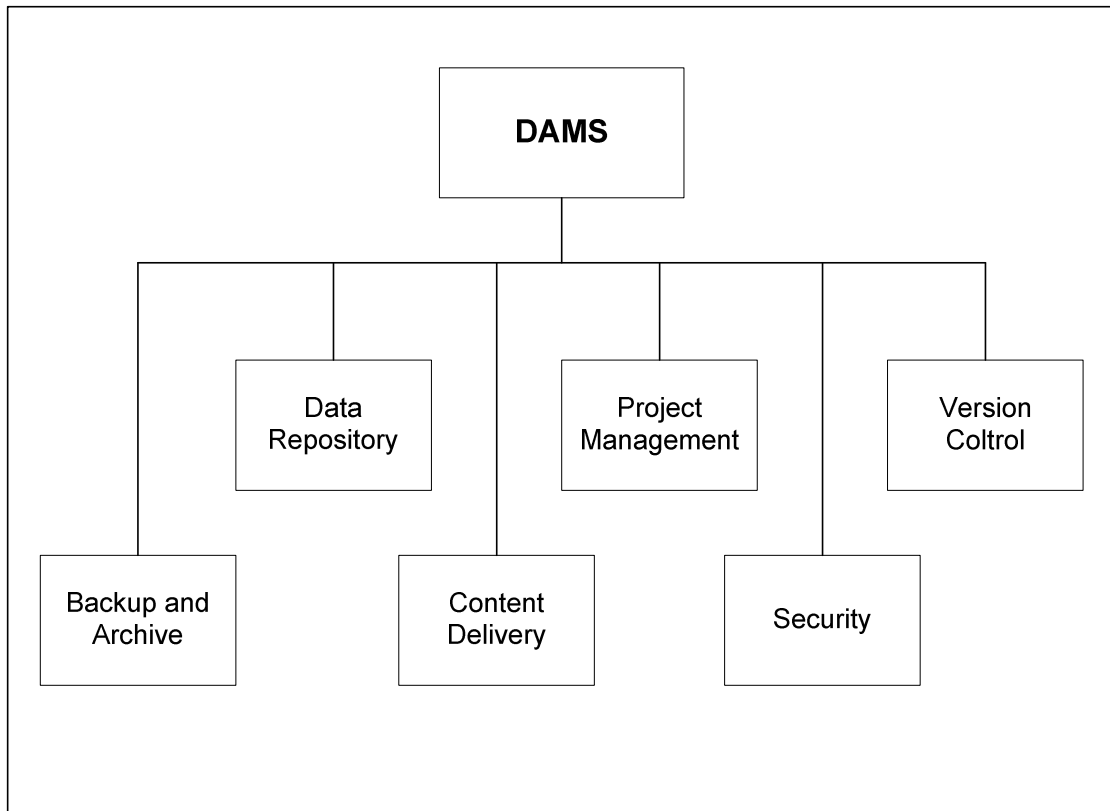


Figure B.1 – System Decomposition.

Appendix C – Use Case Diagrams

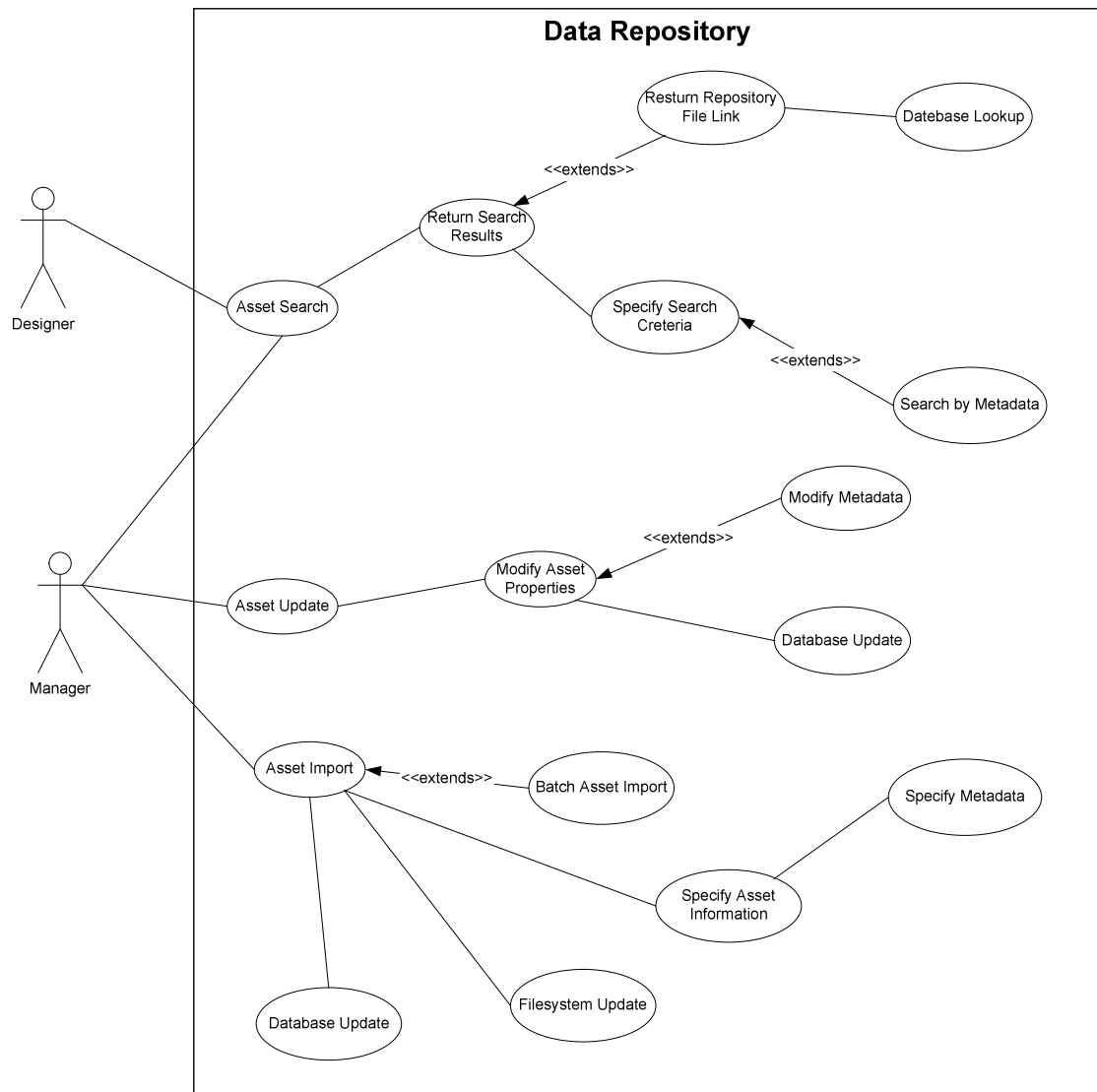


Figure C.1 – Data Repository Use Cases.

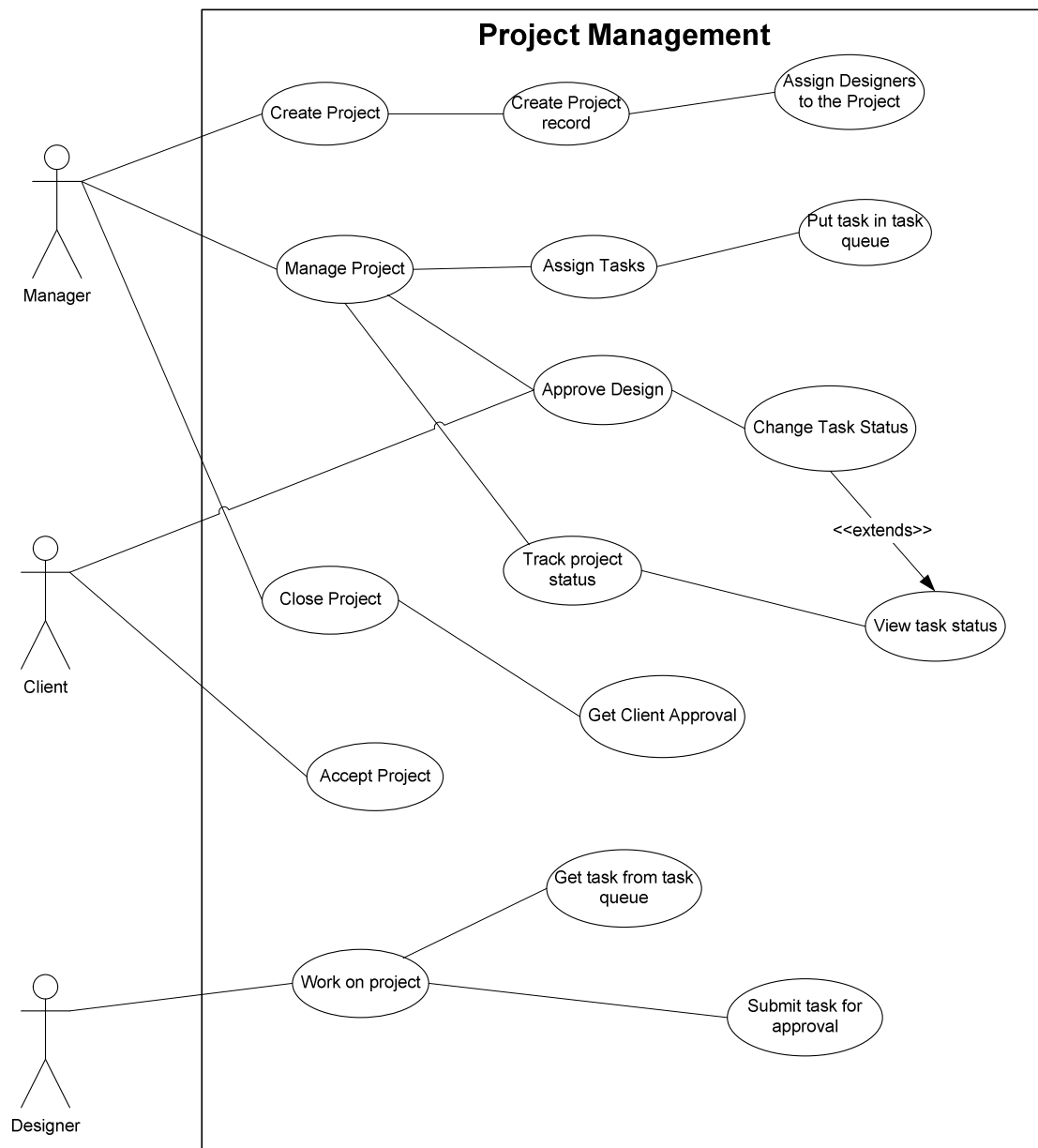


Figure C.2 – Project Management Use Cases.

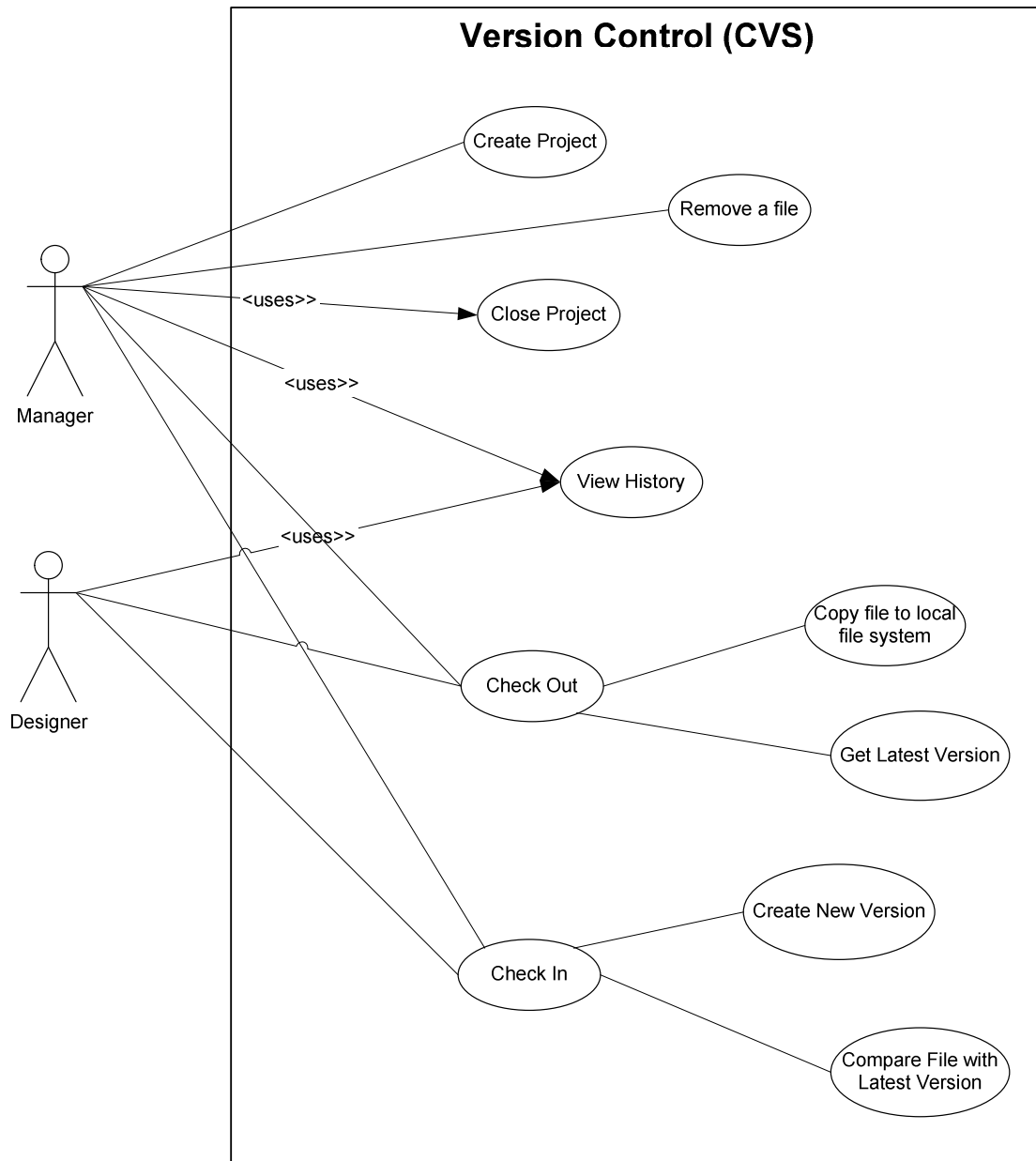


Figure C.3 – Version Control System Use Cases.

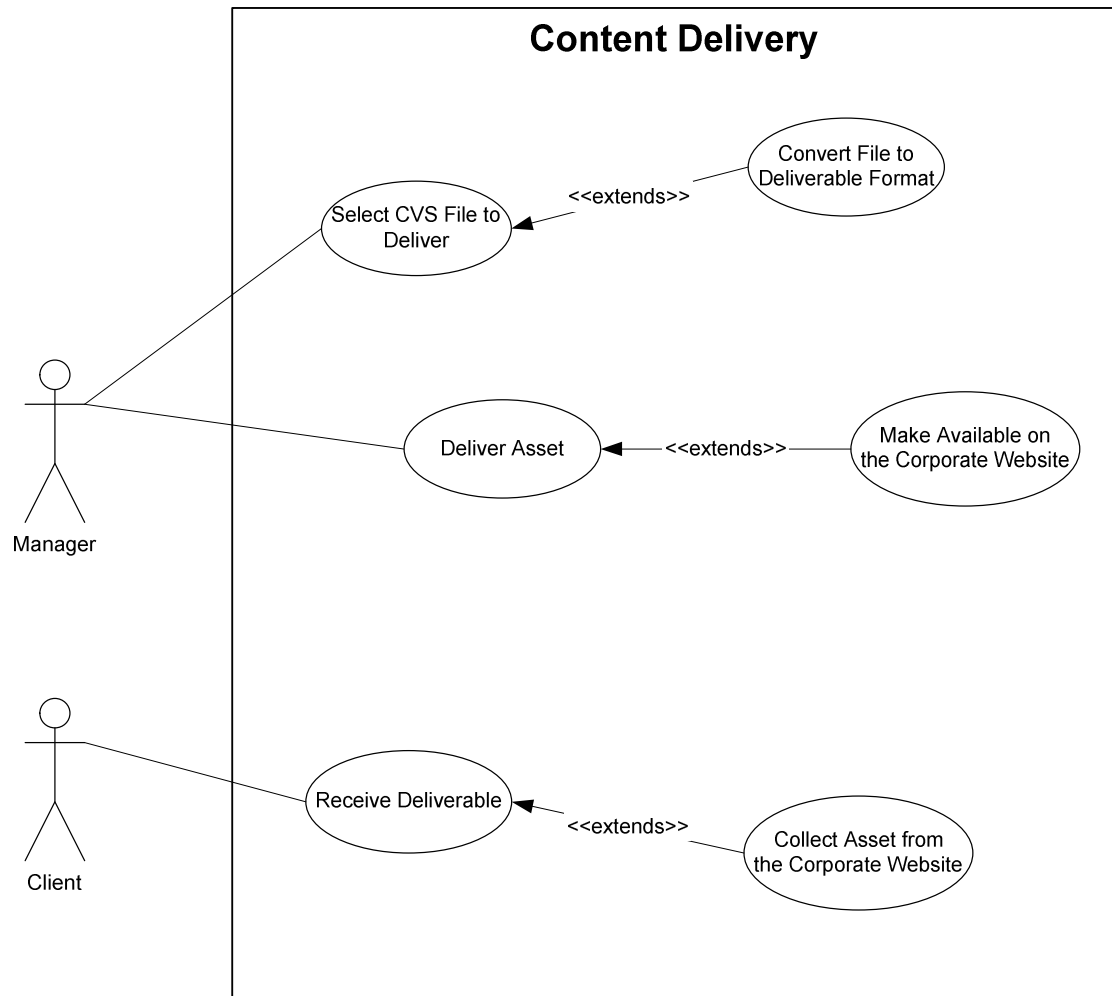


Figure C.4 – Content Delivery System Use Cases.

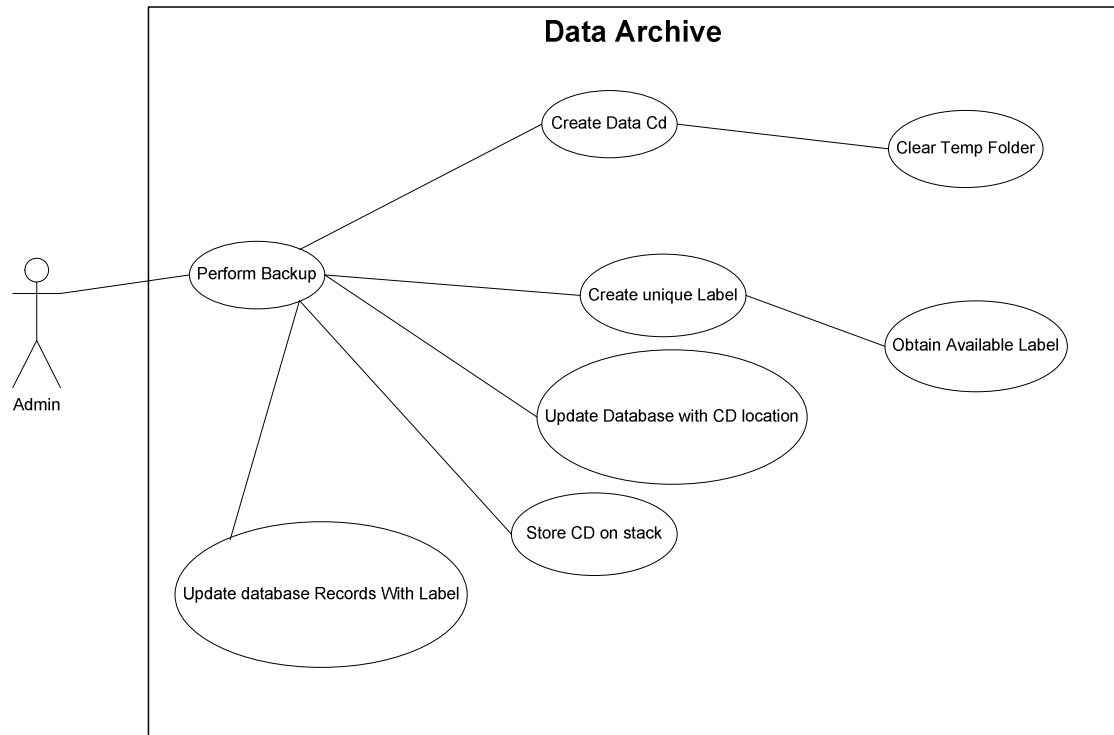


Figure C.5 – Data Archive Use Cases.

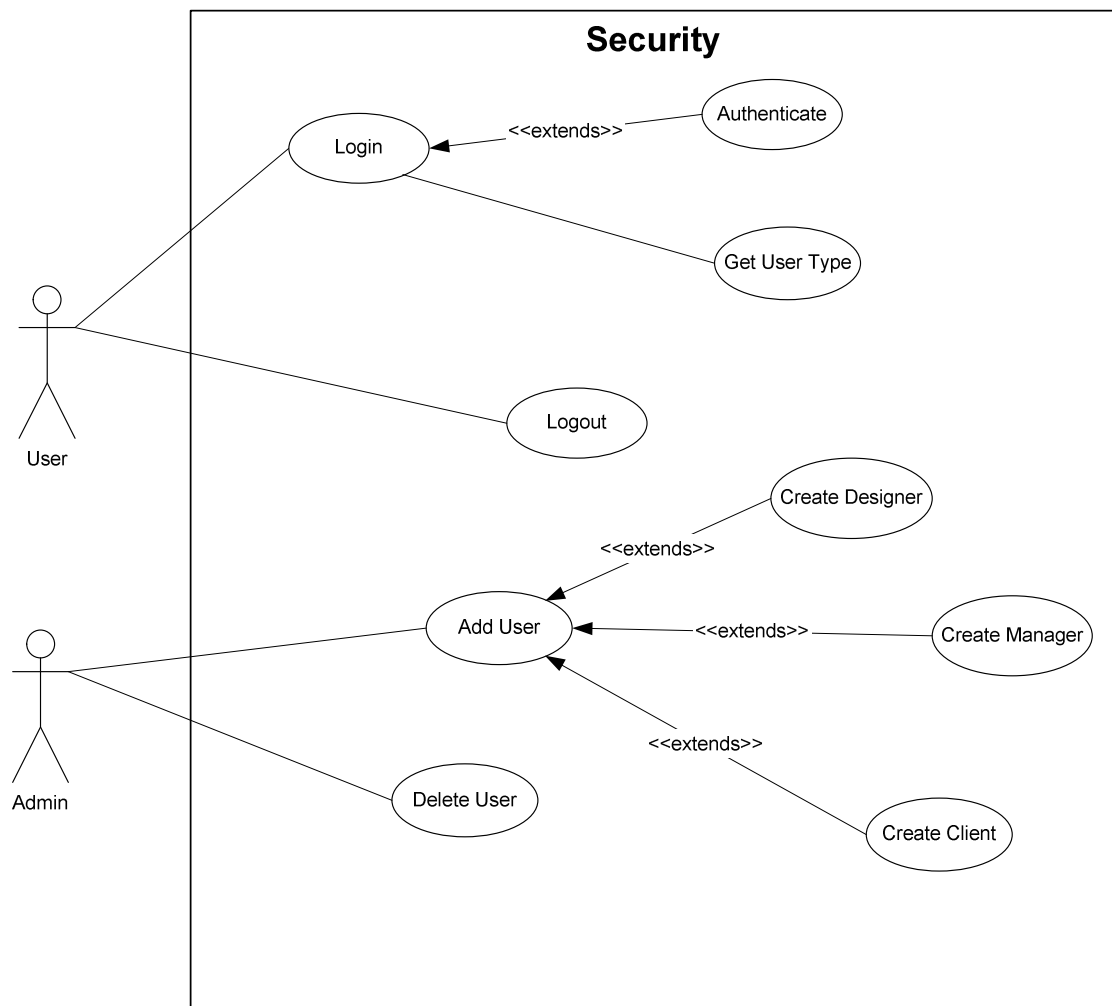


Figure C.6 – Security System Use Cases.

Appendix D – Class Diagrams

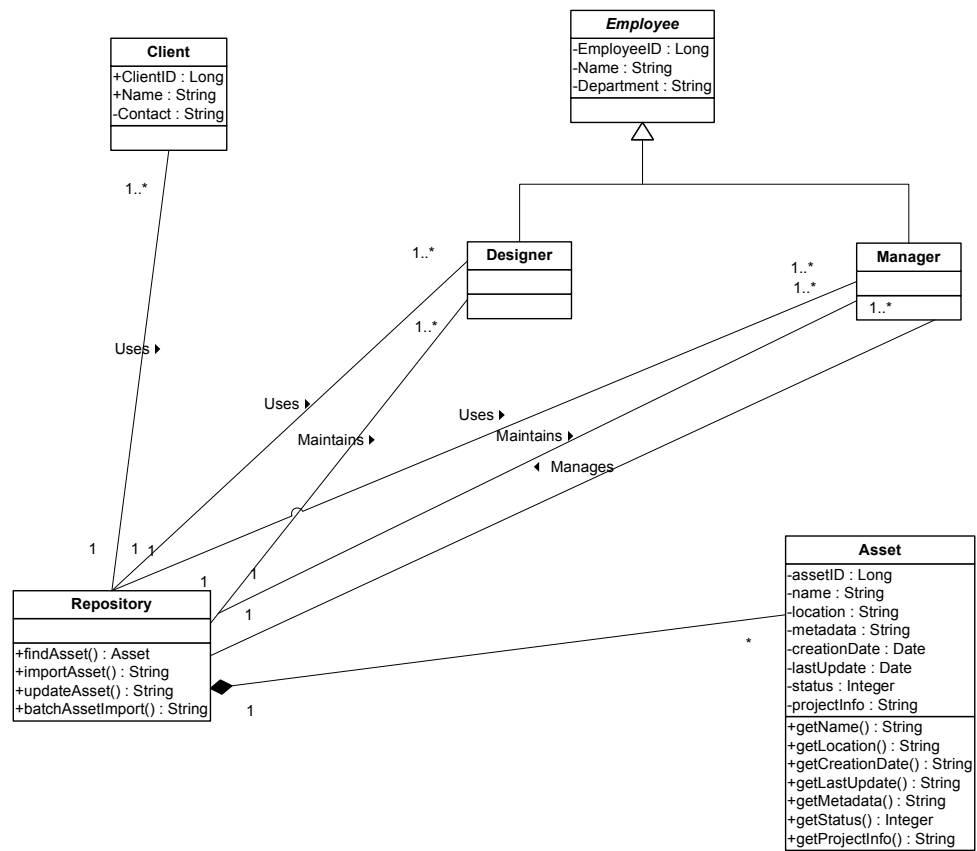


Figure D.1 – Data Repository Class Diagram.

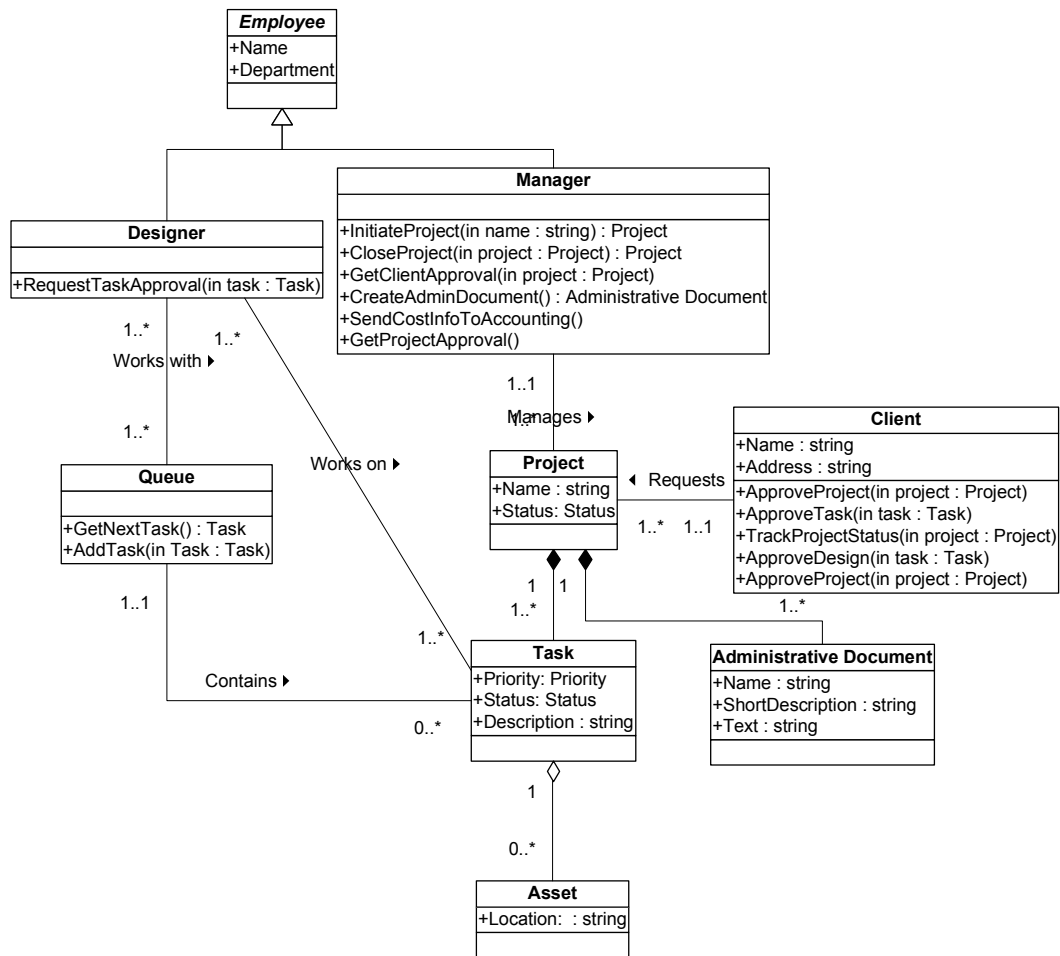


Figure D.2 – Project Management Class Diagram.

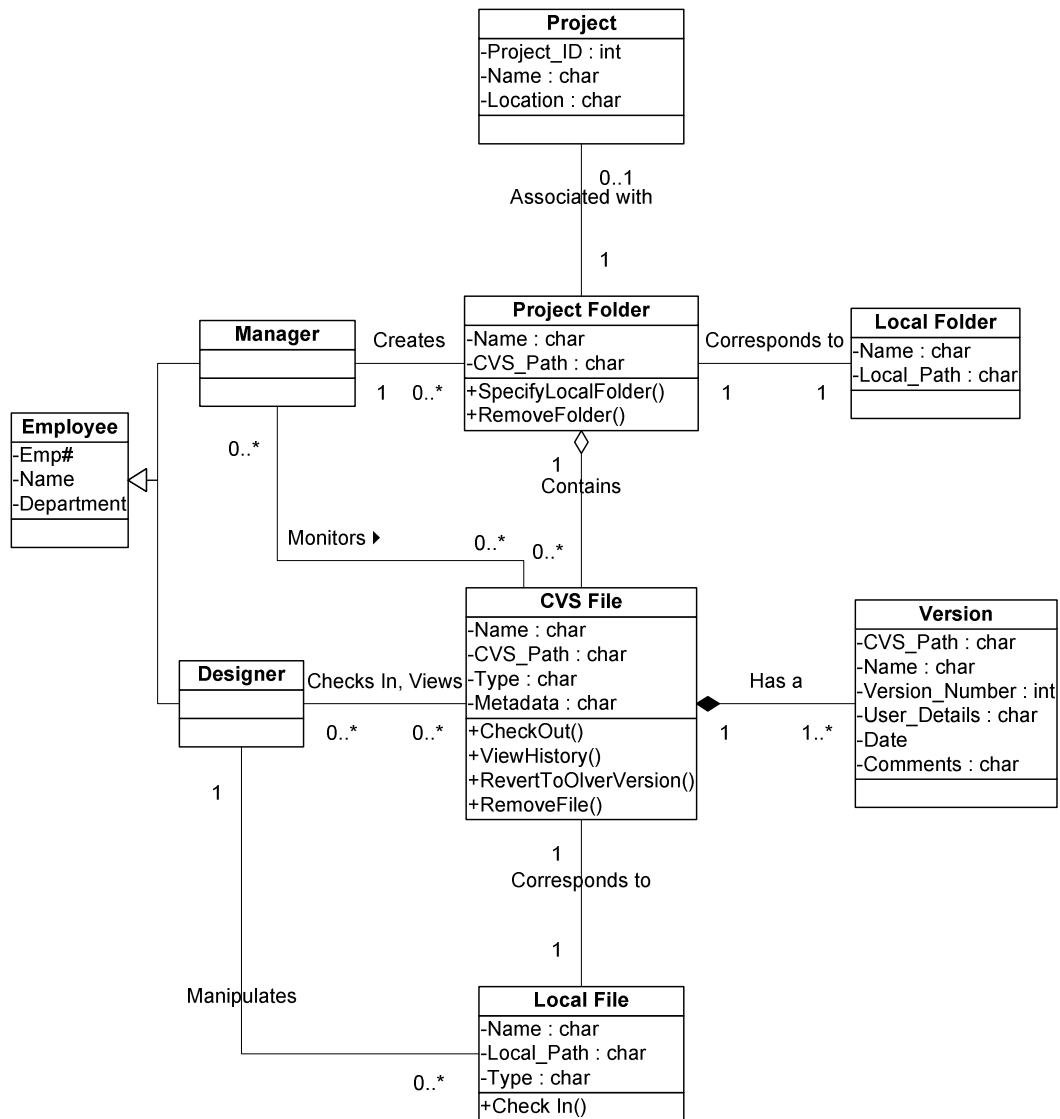


Figure D.3 – Version Control System Class Diagram.

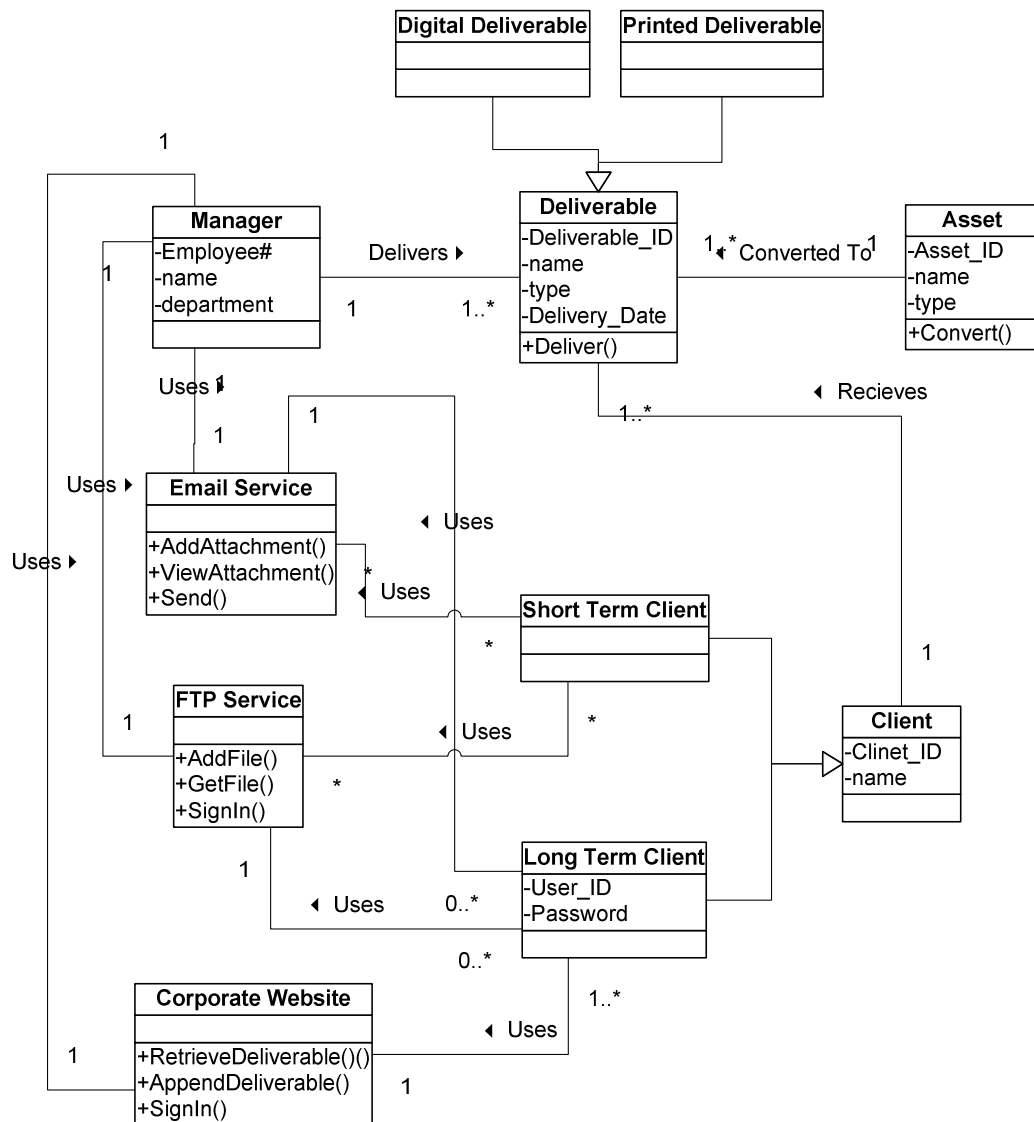


Figure D.4 – Version Control System Class Diagram.

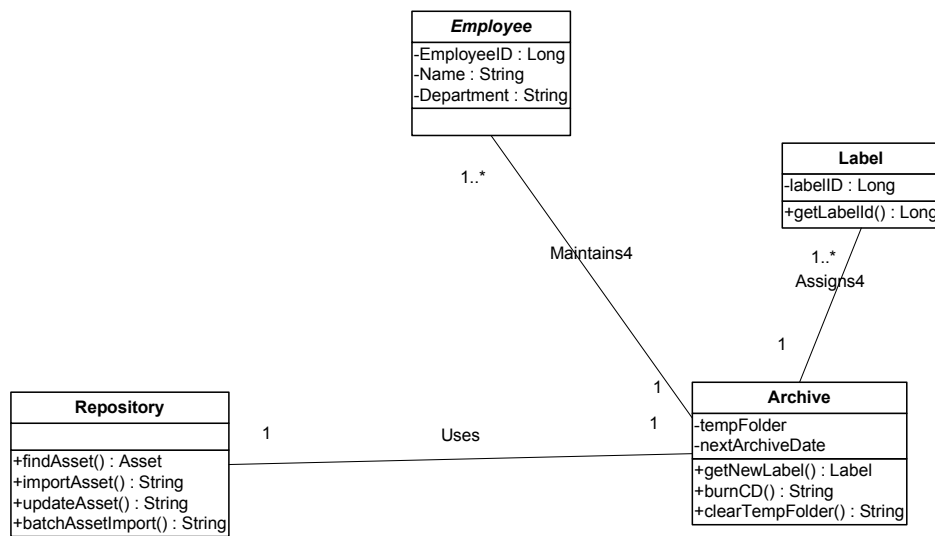


Figure D.5 – Data Archive Class Diagram.

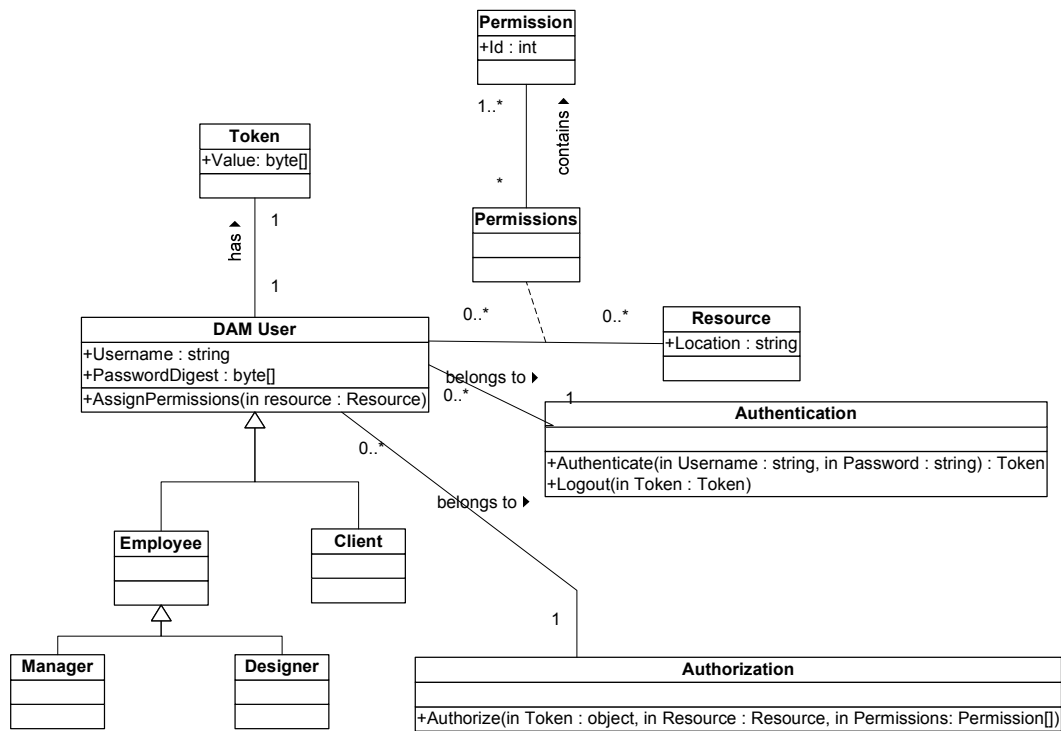


Figure D.6 – Security System Class Diagram.

Appendix E – System State Charts

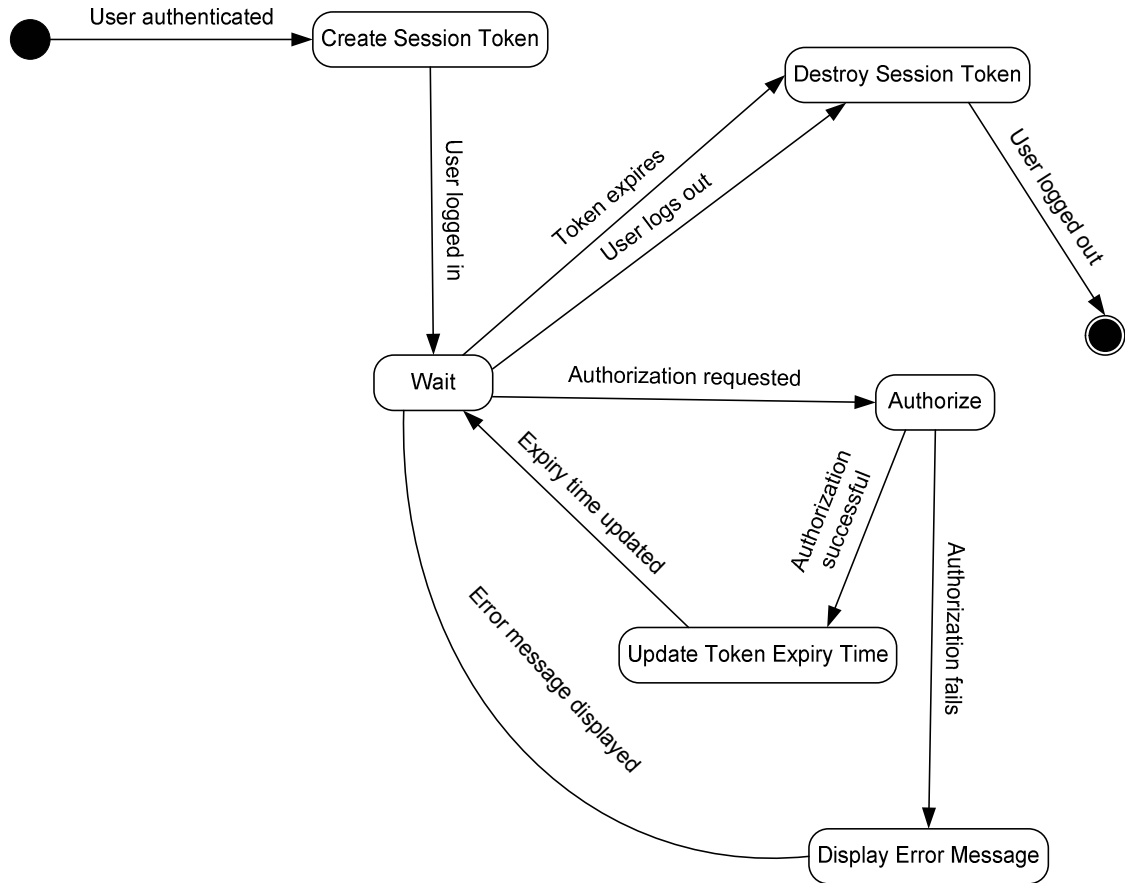


Figure E.1 – User Authentication State Chart.

Appendix F – Sequence Diagrams

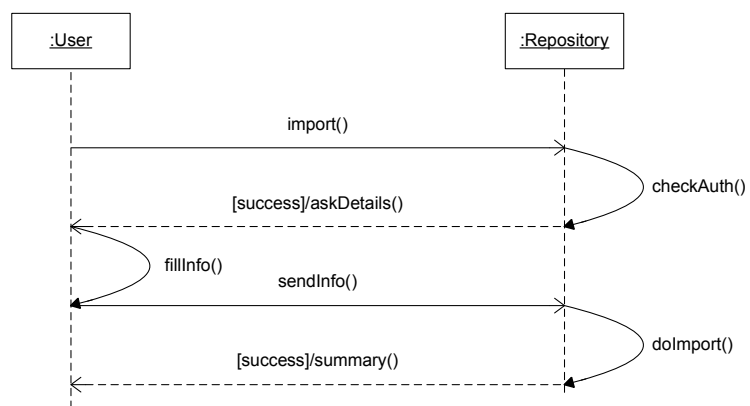


Figure F.1 – Asset Import Sequence.

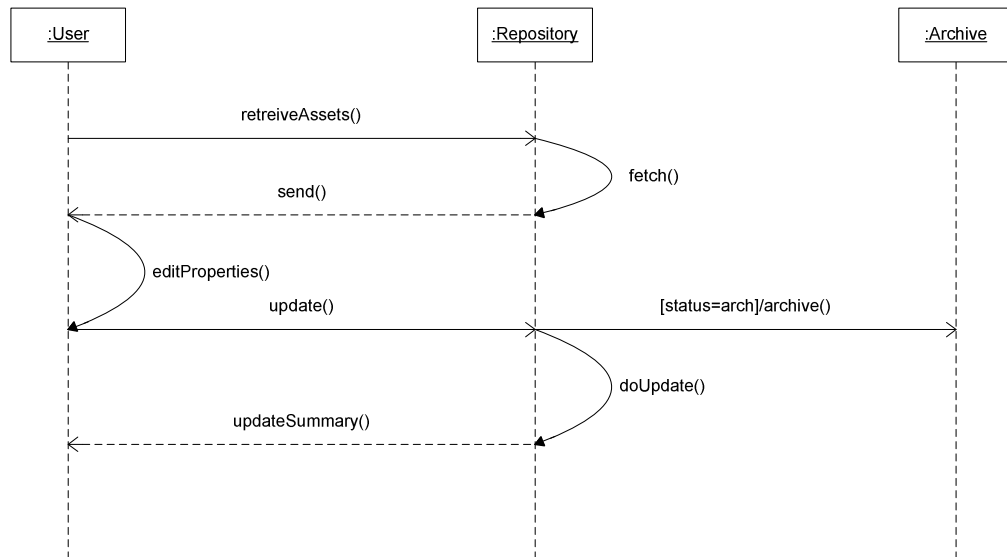


Figure F.2 – Asset Update Sequence.

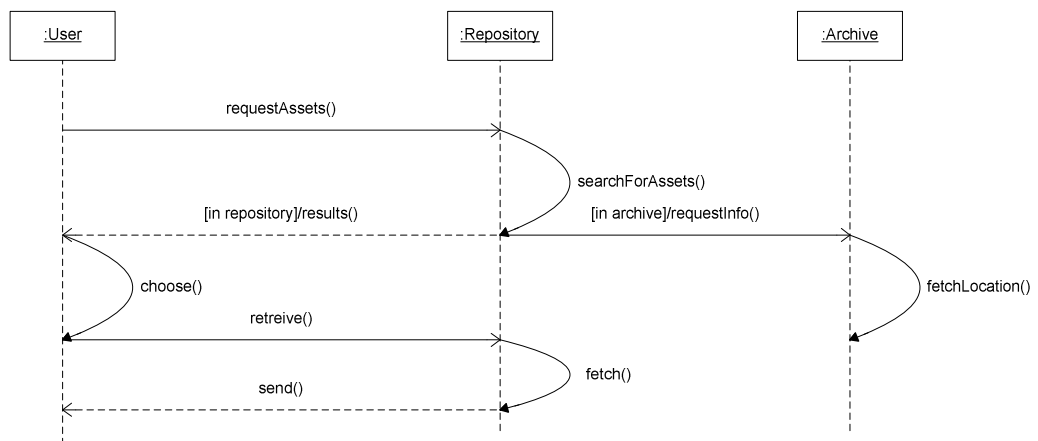


Figure F.3 – Asset Search Sequence.

Project Initiation

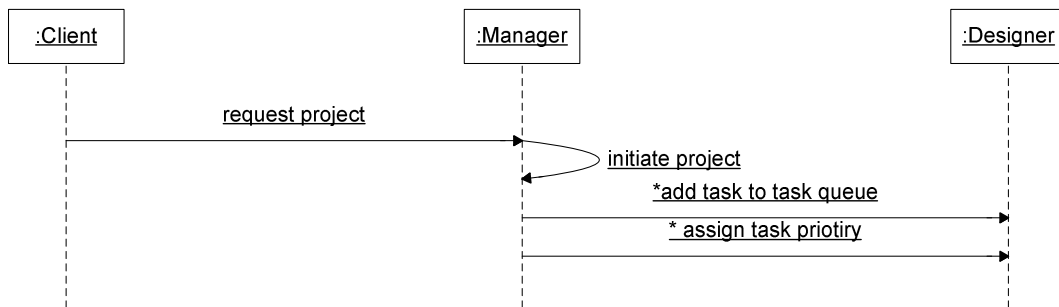


Figure F.4 – Project Initiation Sequence.

Work on project

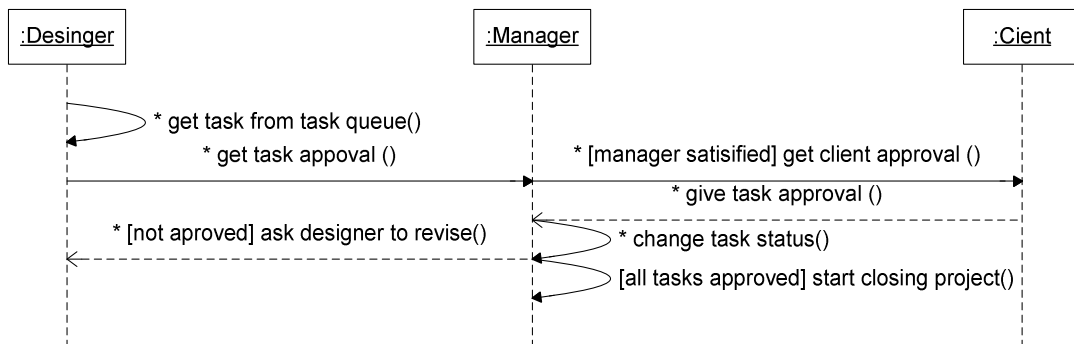


Figure F.5 – Project in Progress Sequence.

Close project

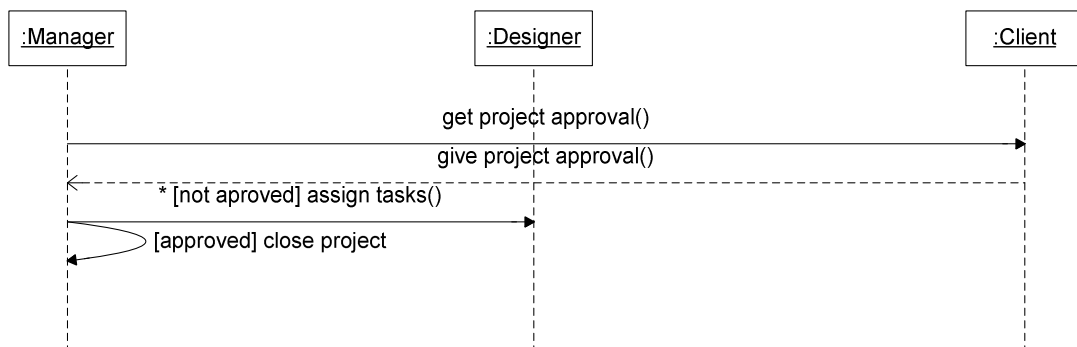


Figure F.6 – Project Complete Sequence.

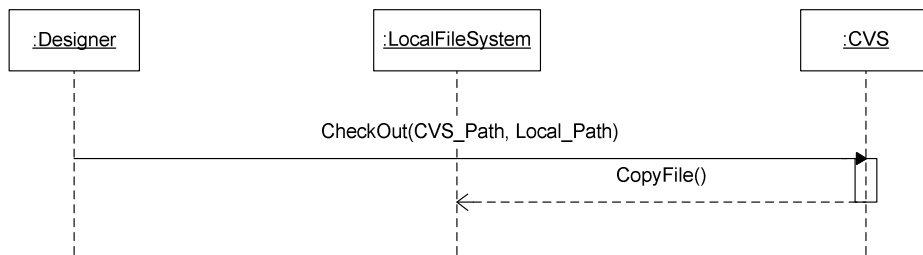


Figure F.7 – Version Control System File Checkout Sequence.

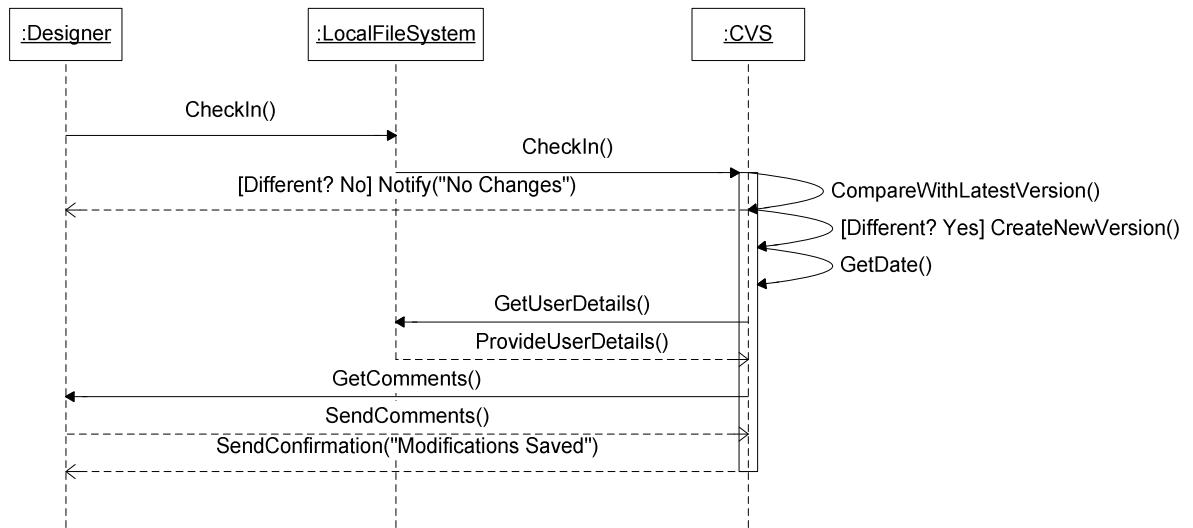


Figure F.8 – Version Control System File Check In Sequence.

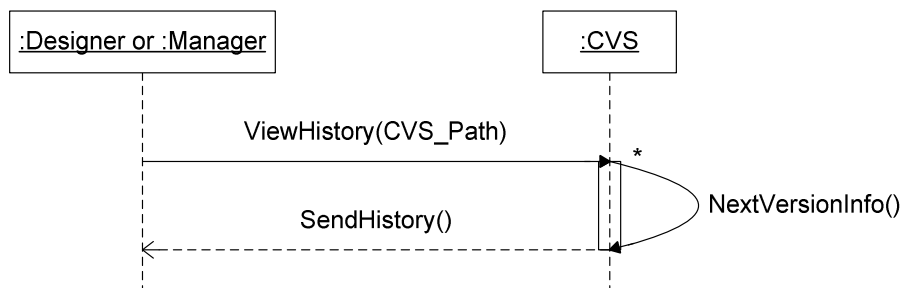


Figure F.9 – Version Control System View History Sequence.

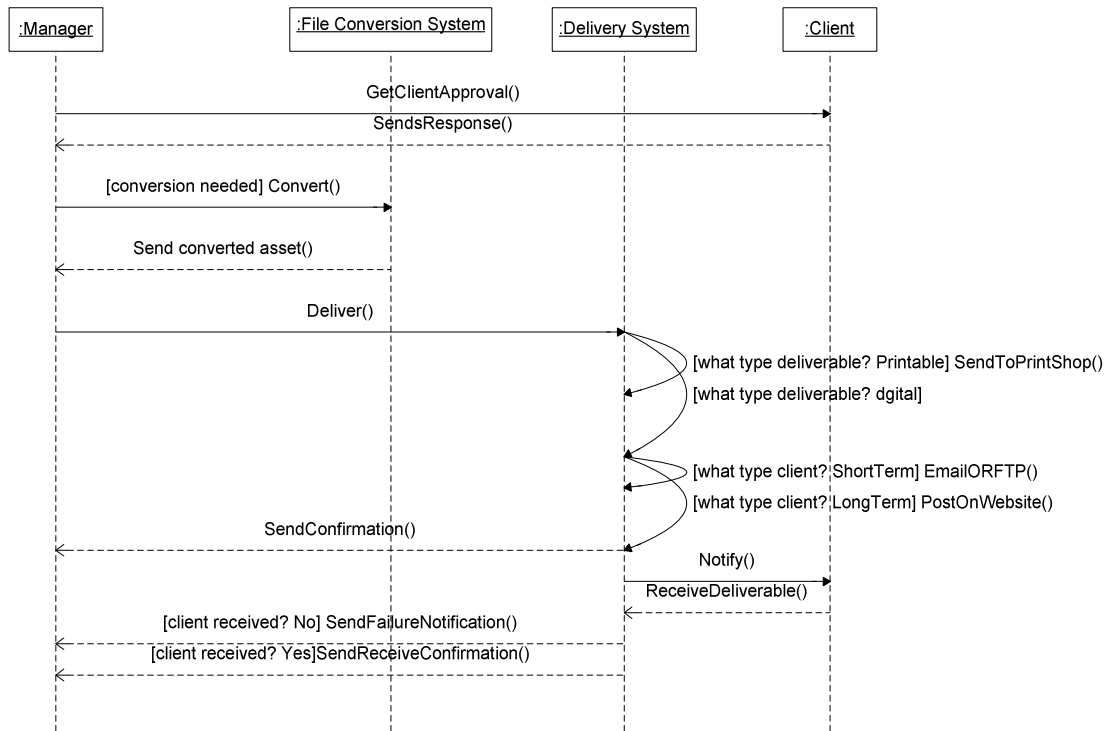


Figure F.10 – Content Delivery Sequence.

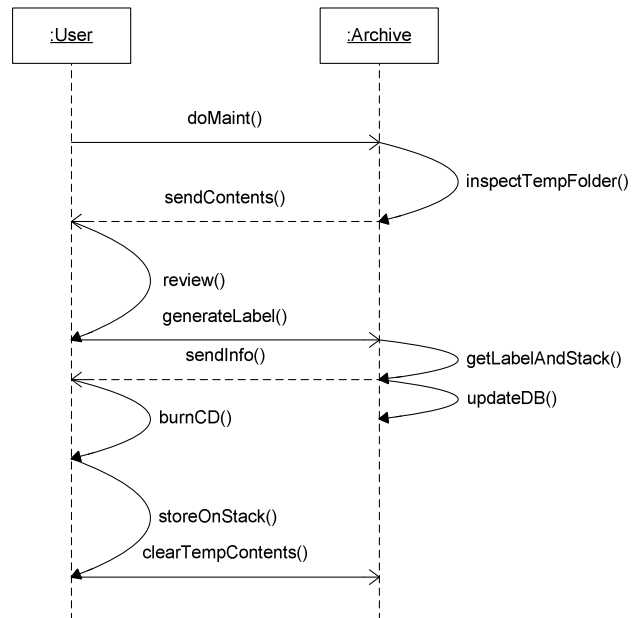


Figure F.11 – File Backup Sequence.

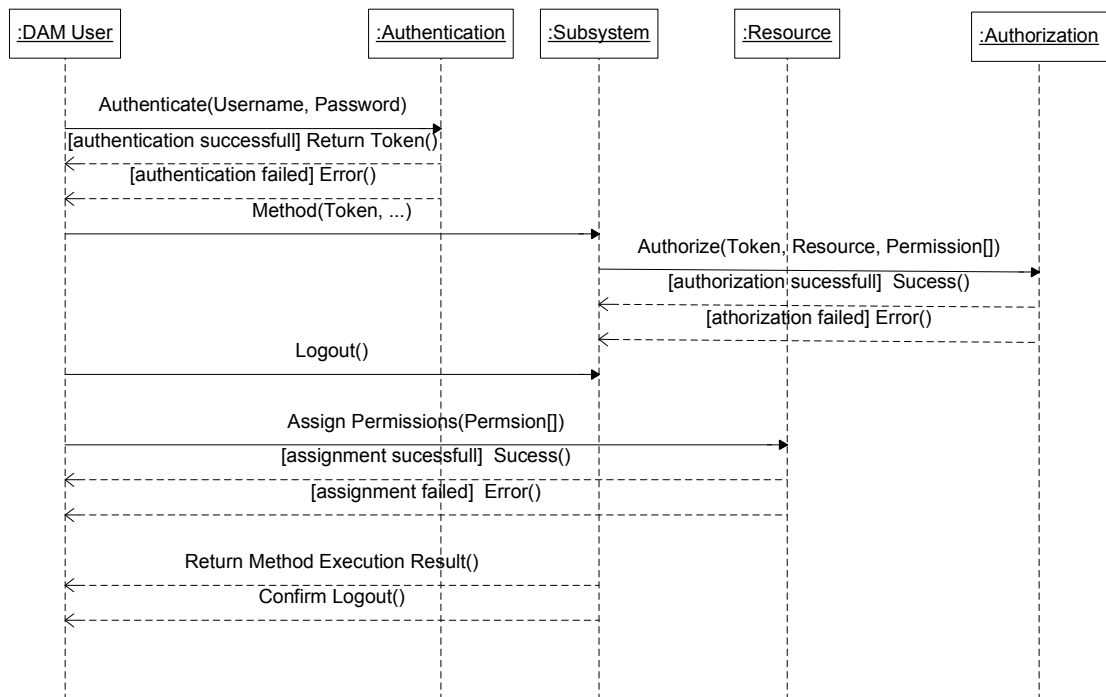



Figure F.12 – User Authentication Sequence.

Appendix G – User Interface Mock Ups

Login Screen



Digital Asset Management and Project Management System

Username

Password

Search Screen






Advanced Search

Find results related to **all** of the words
 related to the **exact phrase**
not related to the words
 related to **any** of the words

logo

Search

Results

Thumbnail	Name	Description
	Logo	CIBC Logo
	Investment Poster	Investment poster with CIBC logo
	Financing	Financing poster with CIBC logo
	Generic Poster	There is a small logo here as well, in the bottom
	Youth	Youth poster with big logo on top

Manager's Administrative Screen

The screenshot shows a web application window titled "CIBC Advertising Campaign - Administration". The interface includes a search bar, a sidebar with project links, and a main content area for managing designers and version control.

Search: A text input field with a "GO" button.

Projects: A sidebar menu with the following items: Royal Bank Advertising Campaign, CIBC Advertising Campaign (selected), Project 1, CSSU Elections Campaign, and Project 7.

Buttons: Admin, Queue In, Queue out, and Delivery.

Client name: CIBC

Designers assigned to the project:

Available		Assigned
Bill Wright	> <	John Doe
Sandy Lotrige		Designer 2
Rick Benson		Cindy Rice
Designer 3		Designer 1
Mike Wilson		
Arnold Jones		

Buttons: Apply Changes, Create Project, Close Project

Version Control:

Check In, Check Out, New Folder, New File

- Administrative Documents
 - New Folder
 - Monday meeting summary
 - Creative request form
- Logos
 - Super Logo
 - Logo 2nd idea
- New Folder
 - File 1
 - File 2

Manager's Create Project Screen

The screenshot shows a web application window titled "CIBC Advertising Campaign - Create new project". The interface includes a search bar, a project list on the left, and a main form area. The form area contains buttons for "Admin", "Queue In", "Queue out", and "Delivery". Below these are fields for "Name" (CIBC Advertising Campaign) and "Client" (CIBC). A table titled "Designers Assigned to the project:" lists designers with checkboxes for assignment. At the bottom, there is a "Version Control" section with buttons for "Check In", "Check Out", "New Folder", and "New File", followed by a tree view of project files and folders.

Search **Advanced Search**

Projects

- Royal Bank Advertising Campaign
- CIBC Advertising Campaign
- Project 1
- CSSU Elections Campaign
- Project 7

Name: CIBC Advertising Campaign **Client:** CIBC

Designers Assigned to the project:

Assigned	Designer
<input checked="" type="checkbox"/>	Bill Wright
<input checked="" type="checkbox"/>	John Doe
<input type="checkbox"/>	Cindy Rice
<input checked="" type="checkbox"/>	Designer 3
<input type="checkbox"/>	Sandy Lortige

Version Control

- Administrative Documents
 - New Folder
 - Monday meeting summary
 - Creative request form
- Logos
 - Super Logo
 - Logo 2nd idea
- New Folder
 - File 1
 - File 2

Manager's Create Task Screen

The screenshot shows a web application window titled "CIBC Advertising Compain - Create new task". The interface includes a search bar at the top left with a "GO" button. Below the search bar is a "Projects" list on the left side, containing links to "Royal Bank Advertising Compain", "CIBC Advertising Compain", "Project 1", "CSSU Elections Compain", and "Project 7". The main content area is divided into two sections. The top section, titled "Task:", contains fields for "Task:" (with the value "Logo"), "Deadline:" (with the value "14 April 2003"), "Designer:" (with the value "John Doe"), and "Status:" (with the value "Initiated"). Below these fields is a "Description:" text area containing the text "John Doe, please, create main company logo. See creative request form for more details." At the bottom of this section are "Send" and "Cancel" buttons. The bottom section, titled "Version Control", contains buttons for "Check In", "Check Out", "New Folder", and "New File". Below these buttons is a tree view showing a file structure: "Administrative Documents" (containing "New Folder" and "Monday meeting summary"), "Creative request form", "Logos" (containing "Super Logo" and "Logo 2nd idea"), and "New Folder" (containing "File 1" and "File 2").

Search

Projects

- [Royal Bank Advertising Compain](#)
- [CIBC Advertising Compain](#)
- [Project 1](#)
- [CSSU Elections Compain](#)
- [Project 7](#)

Task: **Designer:**

Deadline: **Status:**

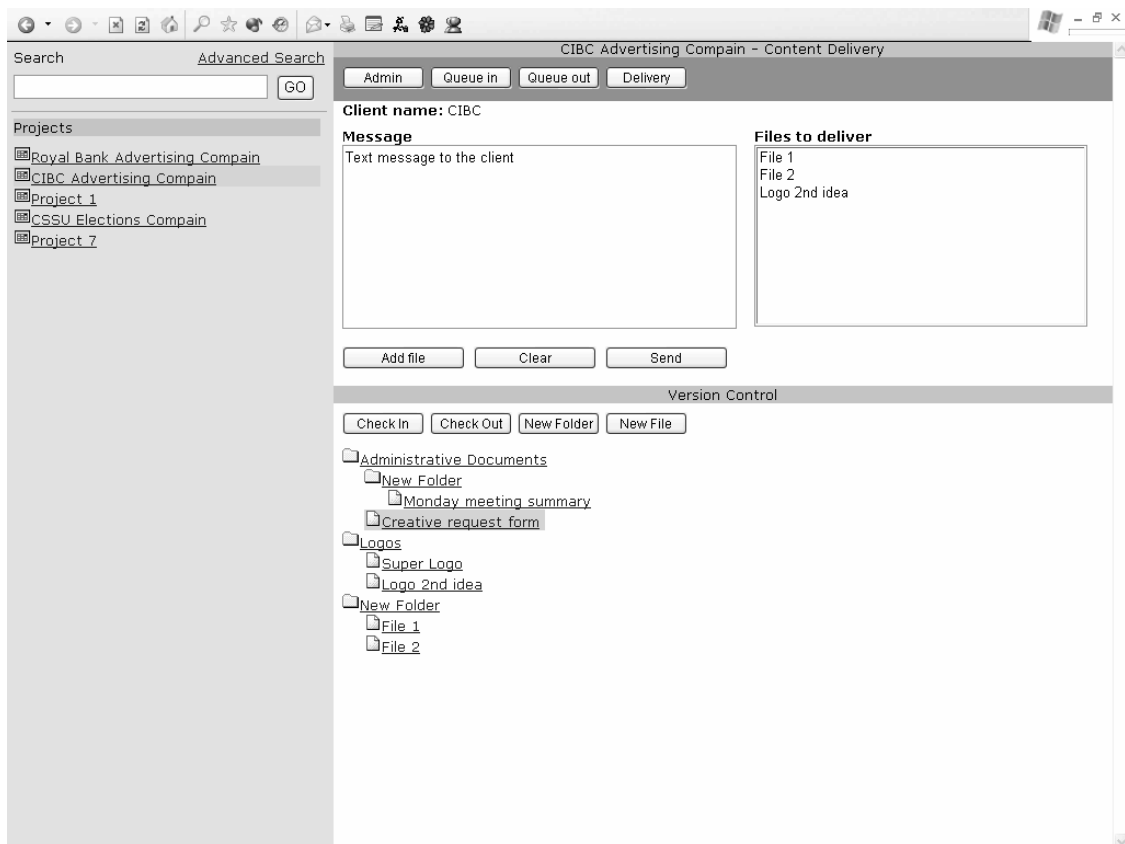
Description:

John Doe, please, create main company logo. See creative request form for more details.

Version Control

- ☐ Administrative Documents
 - ☐ New Folder
 - ☐ Monday meeting summary
 - ☐ Creative request form
- ☐ Logos
 - ☐ Super Logo
 - ☐ Logo 2nd idea
- ☐ New Folder
 - ☐ File 1
 - ☐ File 2

Manager's content delivery screen



Manger's Edit Task Screen

The screenshot shows a web application window titled "CIBC Advertising Compain - Administration". The interface is divided into several sections:

- Search:** A search bar with a "GO" button and a link to "Advanced Search".
- Projects:** A list of projects on the left side, including "Royal Bank Advertising Compain", "CIBC Advertising Compain", "Project 1", "CSSU Elections Compain", and "Project 7".
- Task Details:** A central area showing task information:
 - Task:** Logo
 - Designer:** John Doe
 - Deadline:** 14 April 2003
 - Status:** Initiated (dropdown menu)
 - Description:** John Doe, please, create main company logo. See creative request form for more details.
- Version Control:** A section at the bottom with buttons for "Check In", "Check Out", "New Folder", and "New File". Below these buttons is a tree view of the file structure:
 - Administrative Documents
 - New Folder
 - Monday meeting summary
 - Creative request form
 - Logos
 - Super Logo
 - Logo 2nd idea
 - New Folder
 - File 1
 - File 2

Manger's Queue In Screen

The screenshot shows a web application interface for managing advertising campaigns. The title bar indicates the window is titled "CIBC Advertising Campaign - Incoming Queue".

Search and Navigation:

- Search bar with "Advanced Search" link and a "GO" button.
- Buttons: Admin, Queue In, Queue out, Delivery.
- Create New Task button.

Projects List:

- Royal Bank Advertising Campaign
- CIBC Advertising Campaign
- Project 1
- CSSU Elections Campaign
- Project 7

Task Queue Table:

Task	Designer	Last Modified
Logo	John Doe	11:27, 11 April
Task 1	Designer 2	15:38, 11 April
Logo background	Cindy Rice	11:53, 12 April
Main poster	Designer 1	04:11, 11 April
Task 7	Bill Ryerson	22:28, 12 April

Version Control:

- Buttons: Check In, Check Out, New Folder, New File.
- Administrative Documents
 - New Folder
 - Monday meeting summary
 - Creative request form
- Logos
 - Super Logo
 - Logo 2nd idea
- New Folder
 - File 1
 - File 2

Manger's Queue Out Screen

The screenshot displays a web application interface for managing tasks. The title bar indicates the window is titled "CIBC Advertising Compain - Outgoing Queue". The interface is divided into several sections:

- Search:** Includes a search bar and a "GO" button.
- Advanced Search:** A section for more complex search criteria.
- Projects:** A list of projects on the left side, including "Royal Bank Advertising Compain", "CIBC Advertising Compain", "Project 1", "CSSU Elections Compain", and "Project 7".
- Task Queue:** A table showing the current queue of tasks.
- Version Control:** A section for managing file versions, including buttons for "Check In", "Check Out", "New Folder", and "New File".

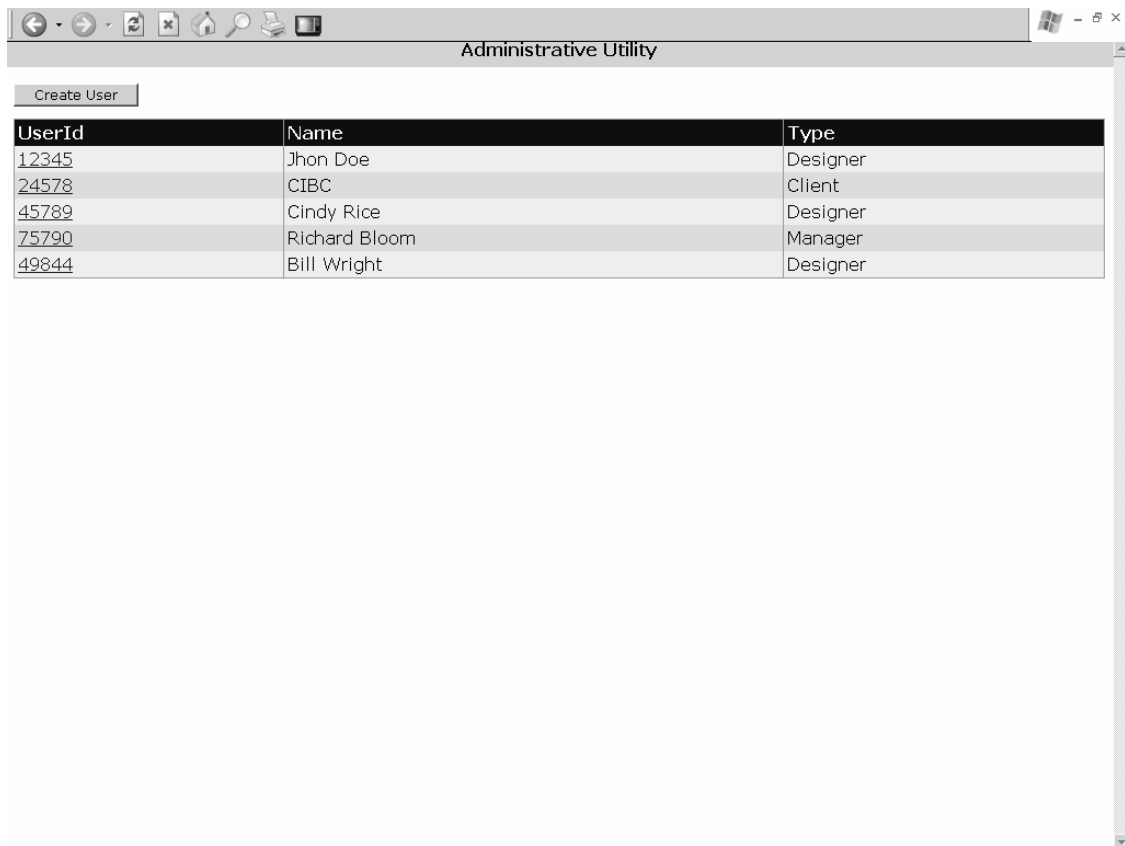
The Task Queue table contains the following data:

Task	Designer	Last Modified
Logo	John Doe	19:30, 11 April
Task 3	Designer 1	02:08, 11 April
Logo foreground	Bill Wright	06:08, 12 April
Investment poster	Designer 4	02:26, 11 April
Task 5	Cindy Rice	14:39, 12 April

The Version Control section shows a tree structure of files and folders:

- Administrative Documents
 - New Folder
 - Monday meeting summary
 - Creative request form
- Logos
 - Super Logo
 - Logo 2nd idea
- New Folder
 - File 1
 - File 2

Admin's Main Screen



Admin's Create User Screen

Administrative Utility

Create User

UserId	Name	Type
12345	Jhon Doe	Designer
24578	CIBC	Client
45789	Cindy Rice	Designer
75790	Richard Bloom	Manager
49844	Bill Wright	Designer

Create User

UserId: Password:

User type: Confirm Password:

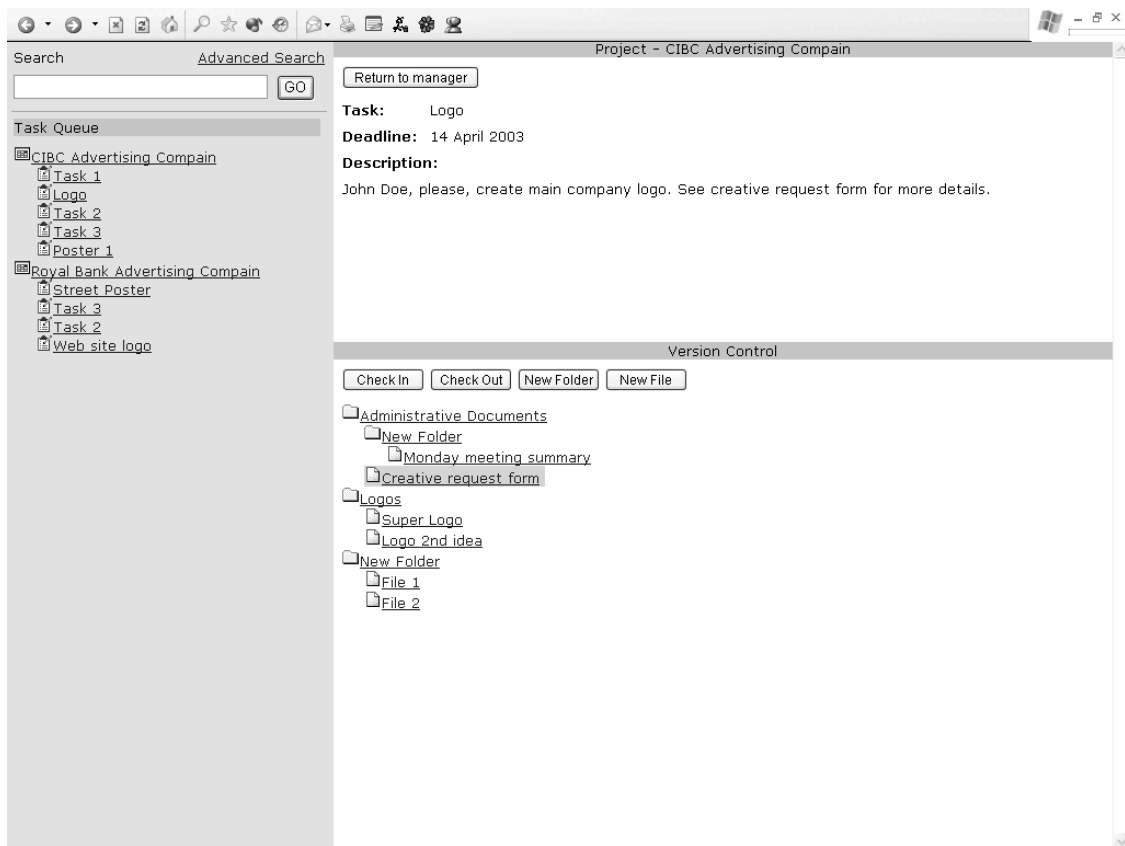
Contact name:

Address:

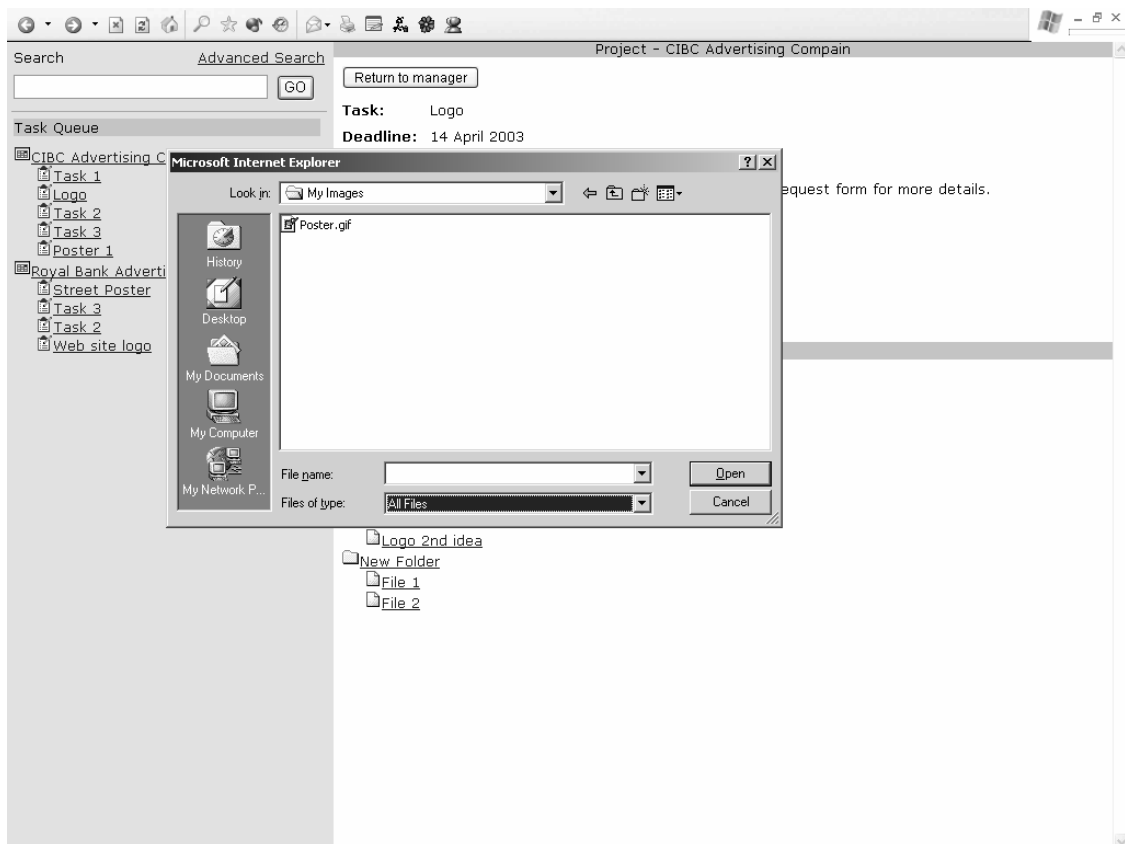
Email:

Phone:

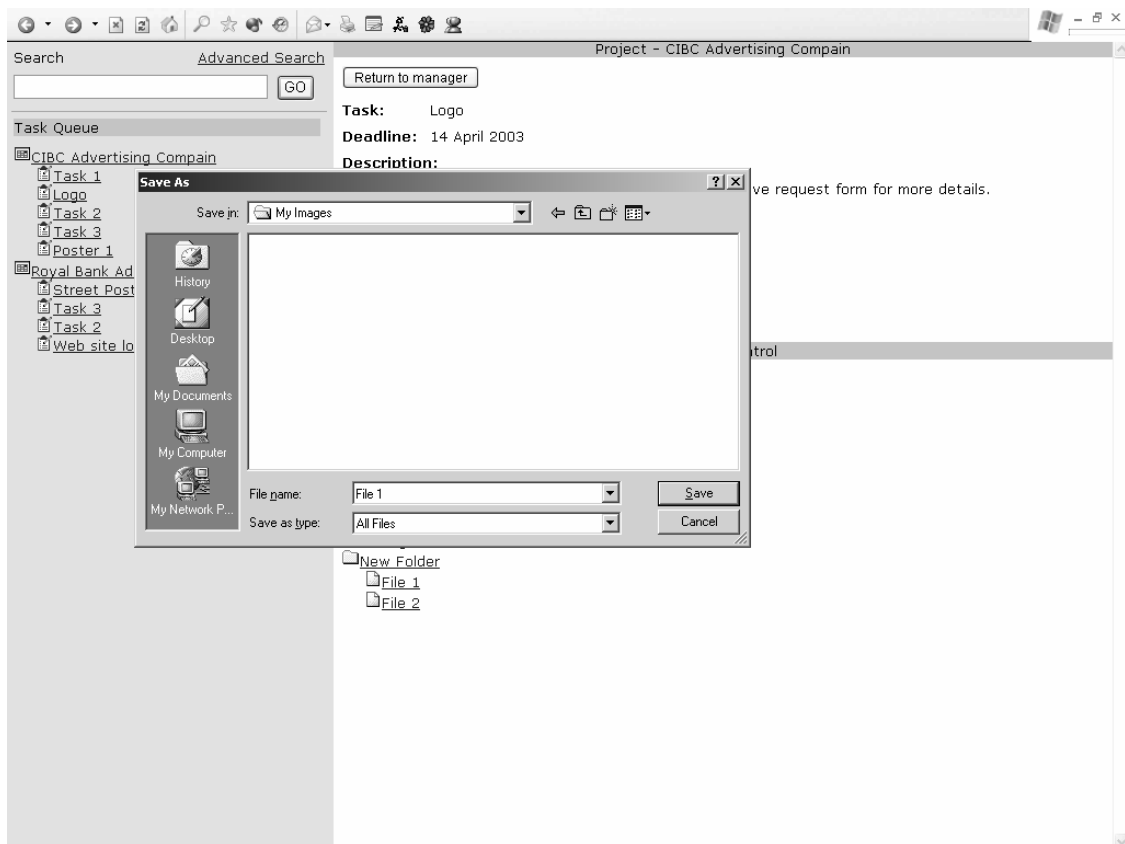
Designer's Main Screen



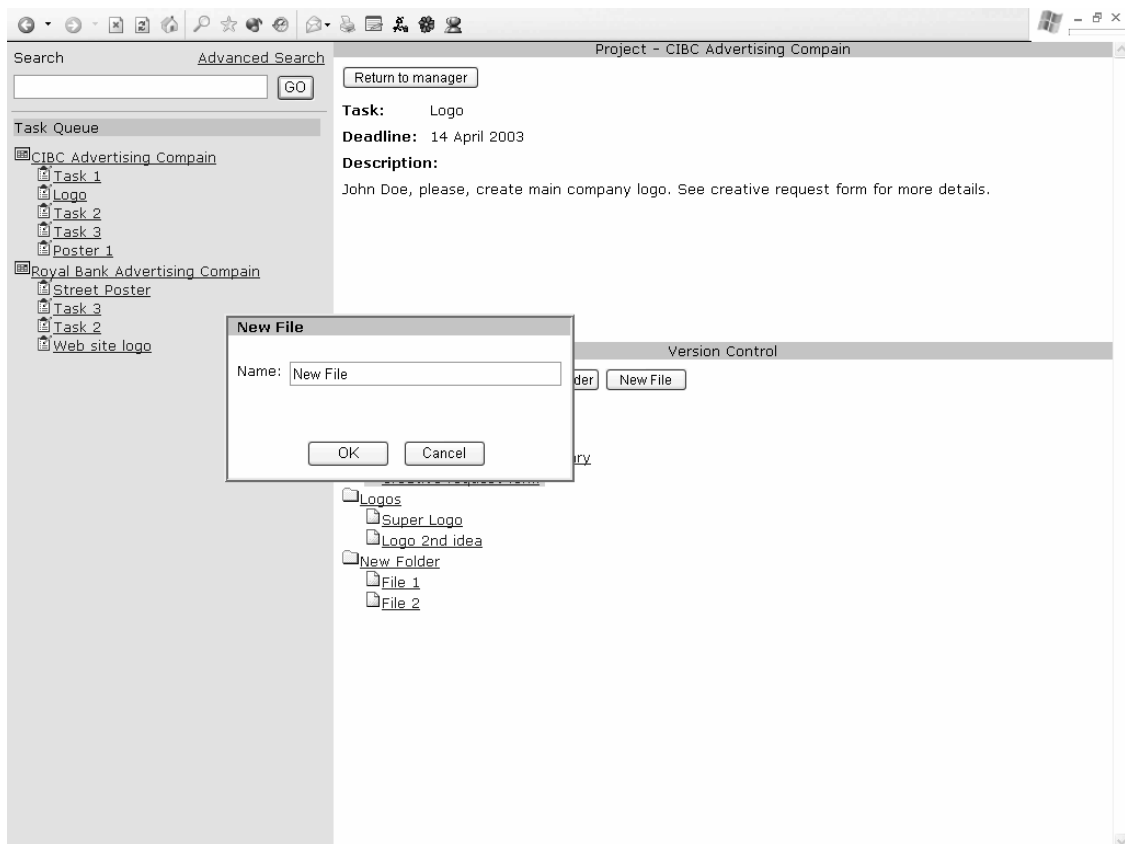
Designer's CVS Check In Screen



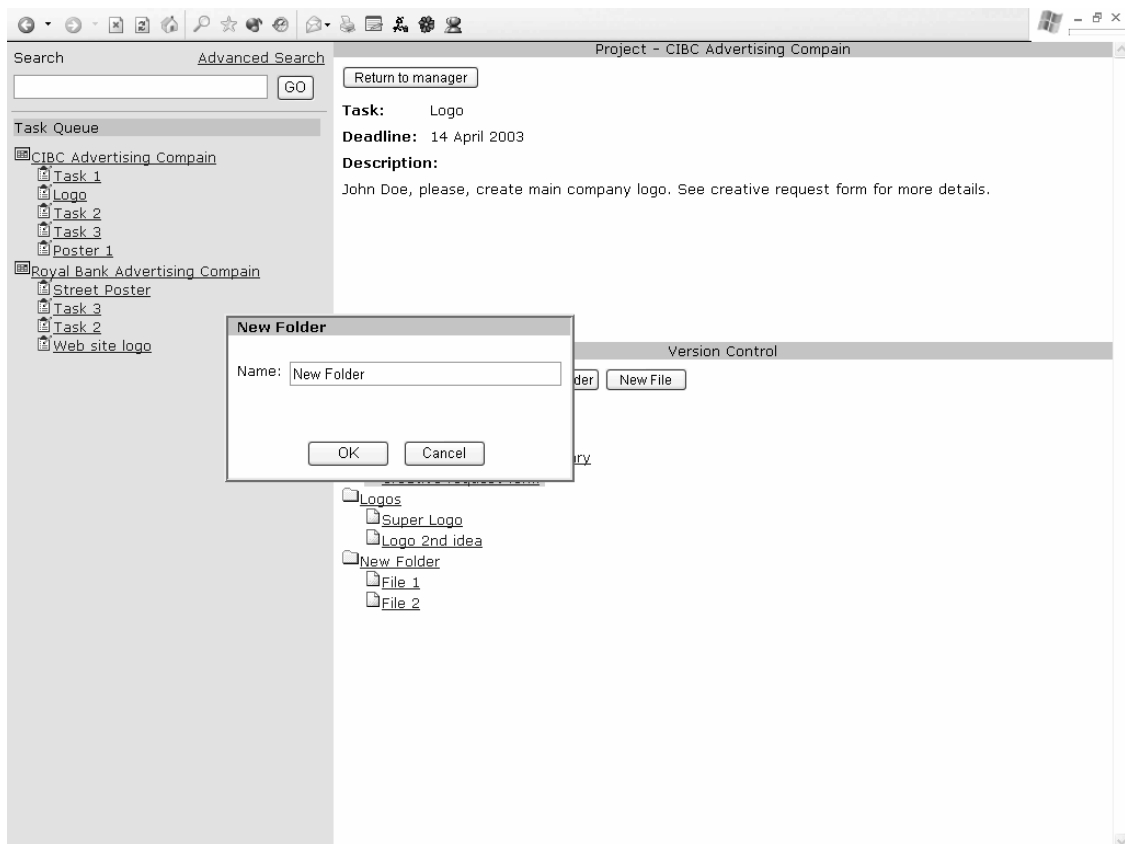
Designer's CVS Check Out Screen



Designer's New File Screen



Designer's New Folder Screen








Client's Main Screen

Requested Approvals

☐ CIBC Advertising Campaign
 ☐ 12 April 2003
 ☐ 12 April 2003
 ☐ 10 April 2003

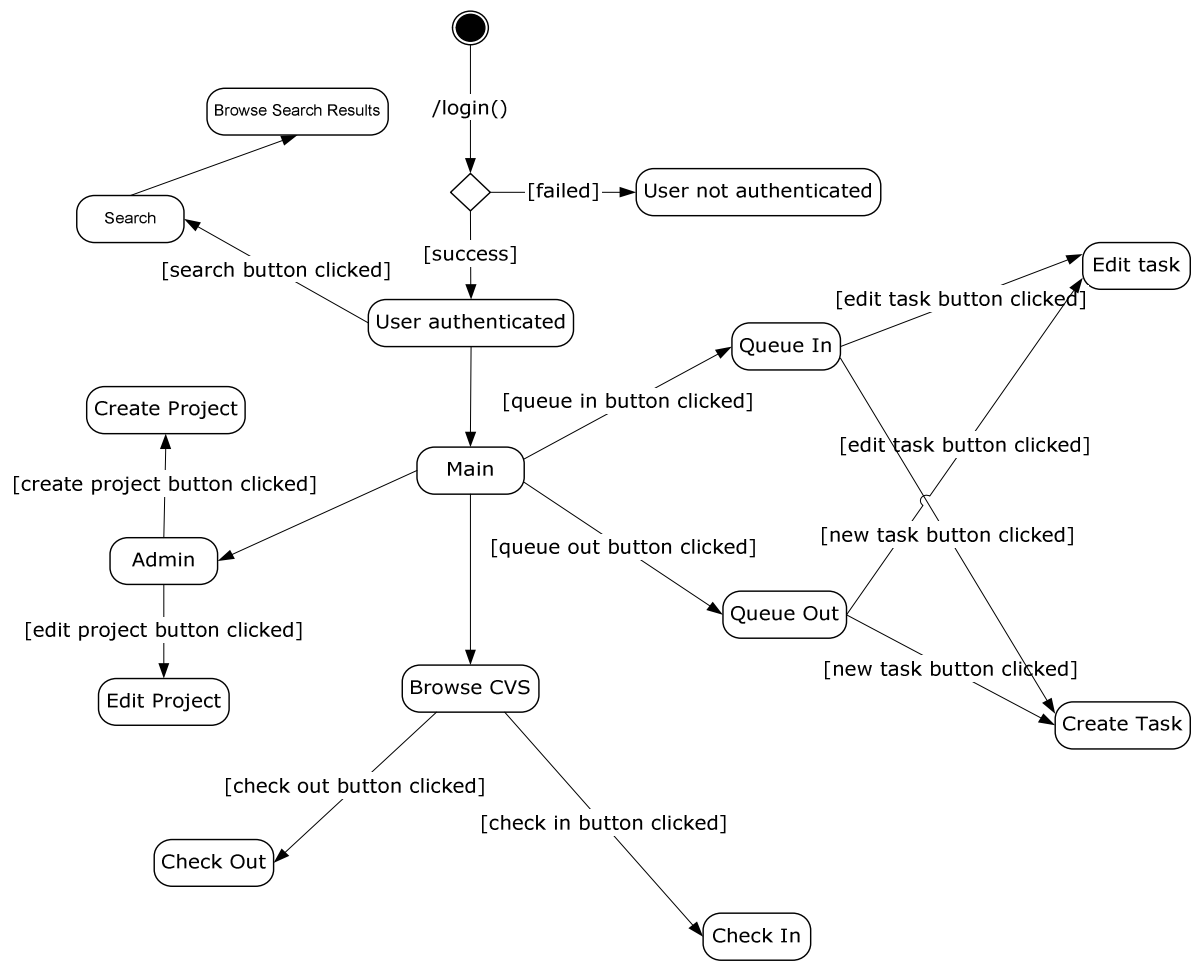
☐ CIBC Investments Campaign
 ☐ 10 April 2003
 ☐ 7 April 2003
 ☐ 5 April 2003
 ☐ 1 April 2003

CIBC Advertising Campaign - 12 April 2003

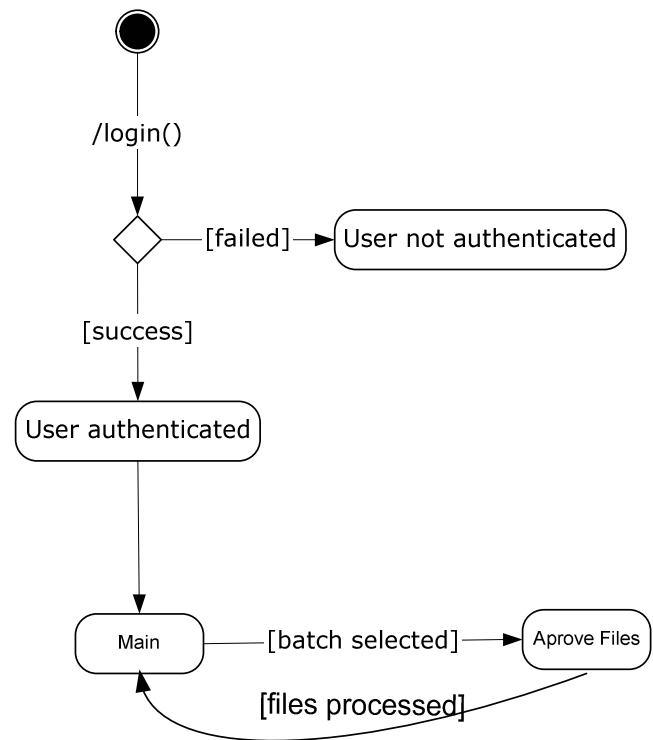
Approval	Thumbnail	Name	Note
<input type="button" value="Rejected"/>		Logo	Please update the background color
<input type="button" value="Pending"/>		Investment Poster	
<input type="button" value="Approved"/>		Financing	
<input type="button" value="Pending"/>		Generic Poster	
<input type="button" value="Approved"/>		Youth	

Appendix H – User Interface State Charts

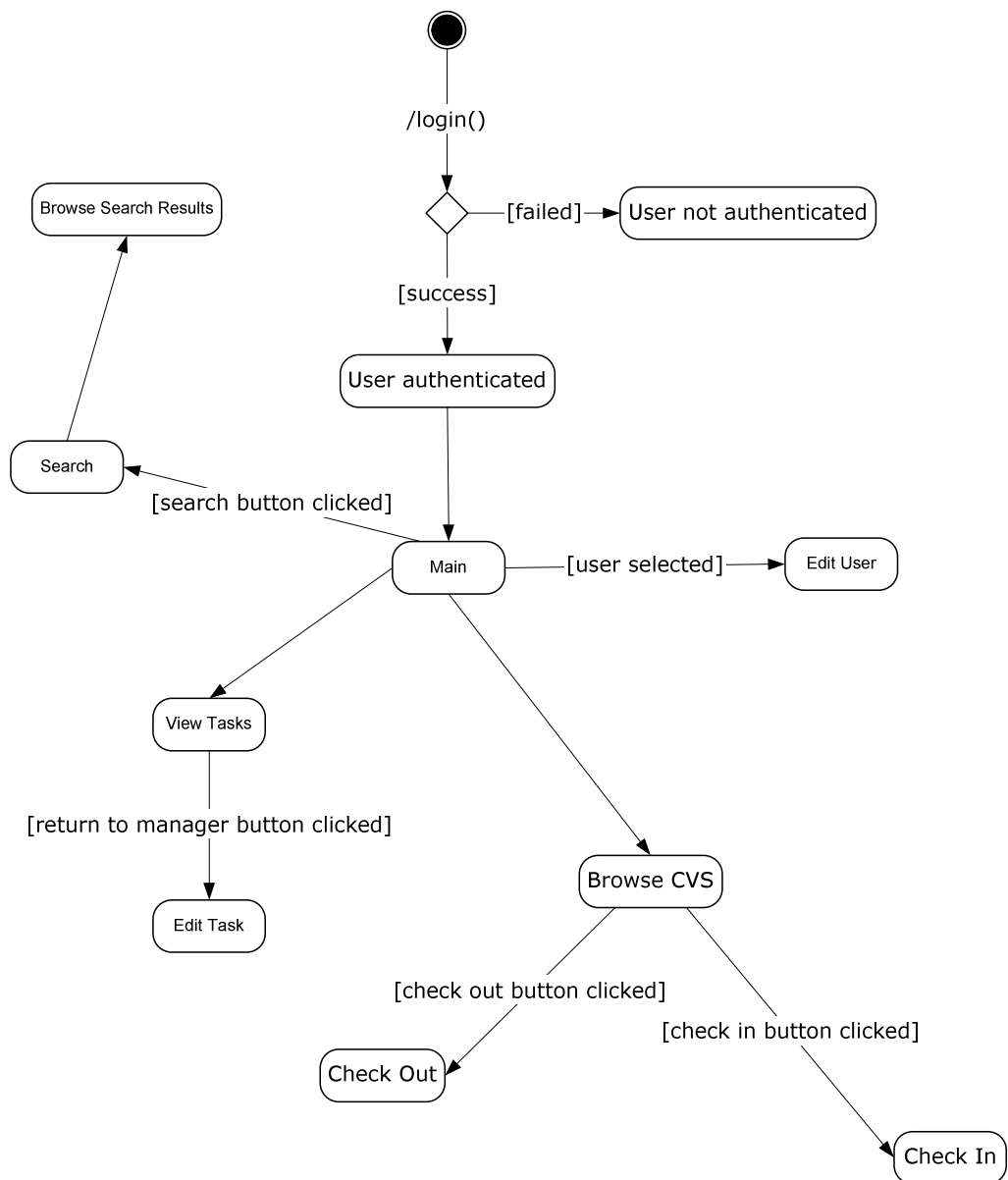
Manager's GUI State Chart



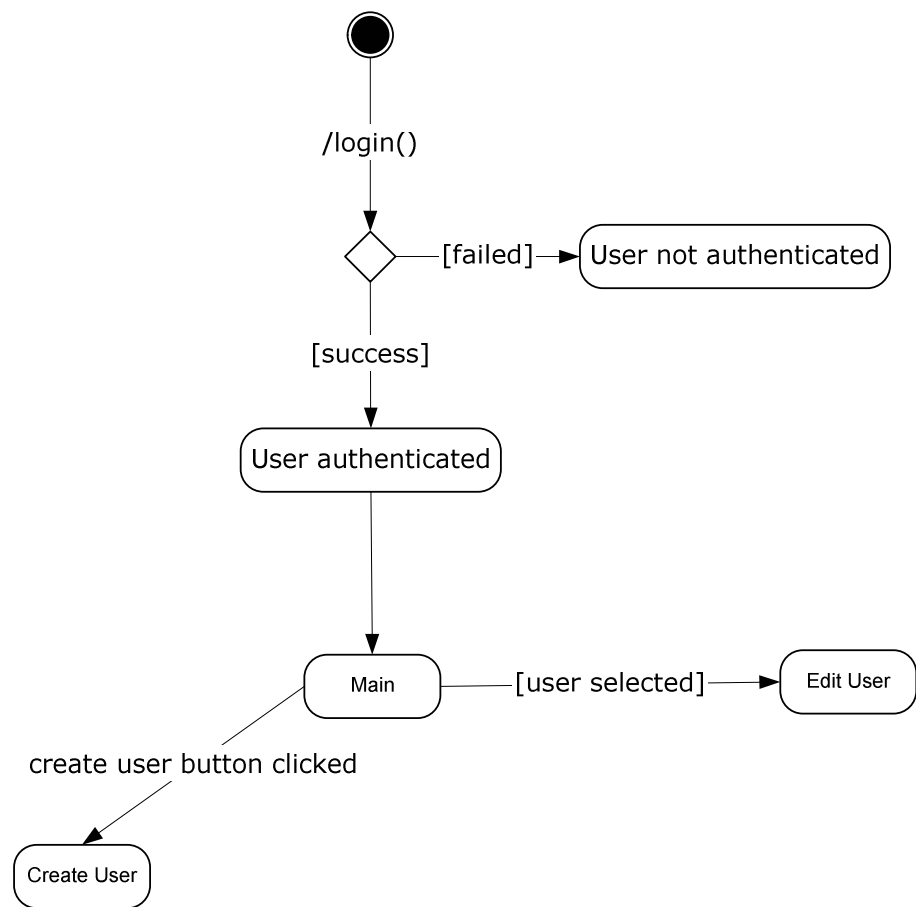
Client's GUI State Chart



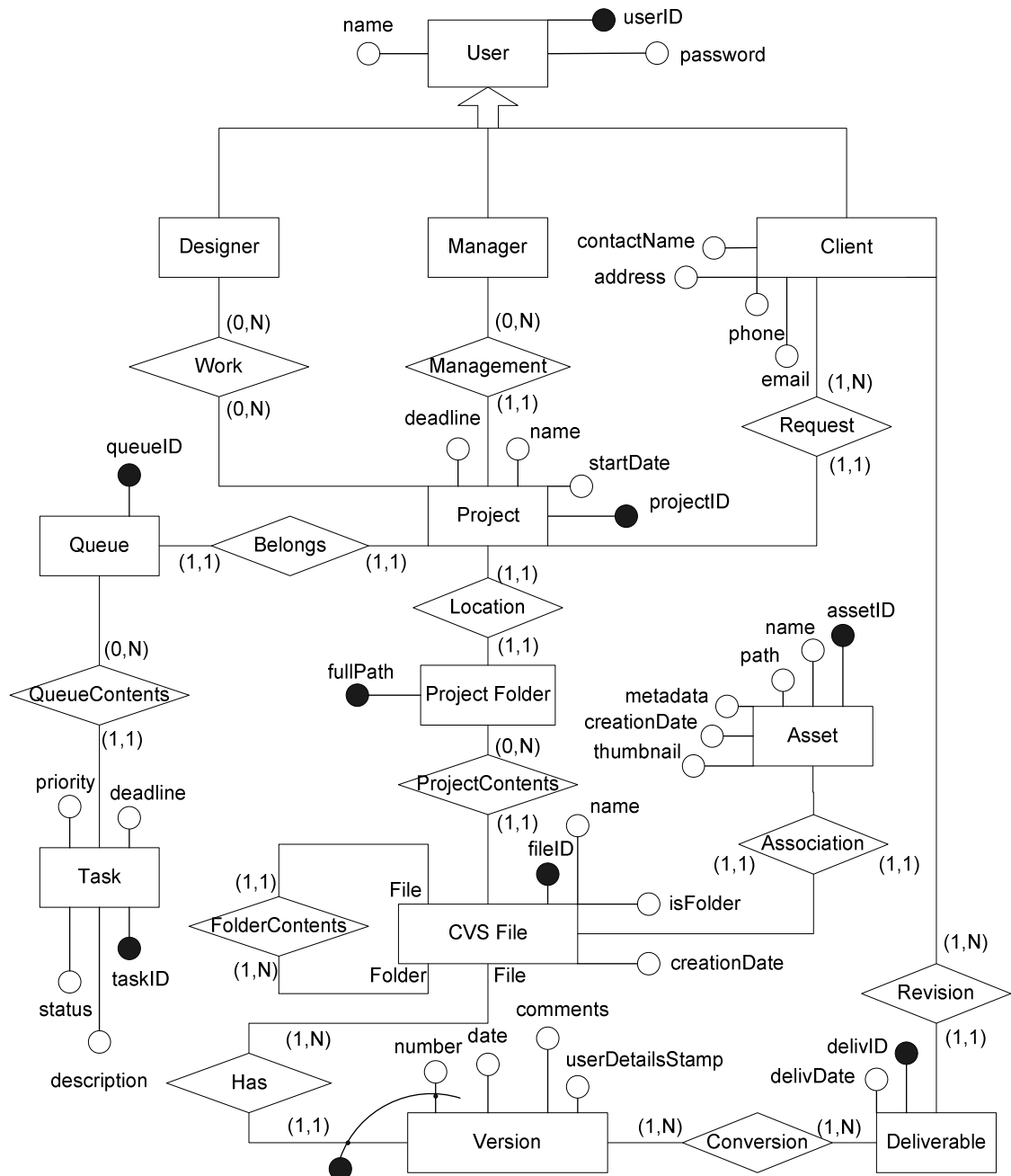
Designer's GUI State Chart



Admins's GUI State Chart



Appendix I – Entity Relationship Diagram



Appendix J – Data Dictionary

The entities from the class diagram for the system are described in the table below:

Entity	Description	Attributes	Identifier
User	Person working in the company.	userID, name, password	userID
Employee	Specialization of User. An employee is either a Manager or a Designer (but not both).	<i>employeeID, isManager</i>	employeeID
Client	Specialization of User. Client is a client company that requests a project to be done from the design studio.	<i>clientID, address, contactName, phone, email</i>	clientID
Project	Company project on which Employees are working.	projectID, name, startDate, deadline, clientID, managerID	projectID
Queue	A Queue is a list of tasks that are assigned by the manager to a designer that works on a particular project. Every designer and every manager has one queue per project.	queueID, projectID	queueID
Task	A task is a work assignment initiated by the manager and addressed to a designer. A task is specific to a project. An example of a task may be "Create a logo	taskID, priority, status, deadline, description, queueID	taskID

	for CIBC with the requirements listed in the client request form."		
ProjectFolder	ProjectFolder is a folder in the CVS designated for a particular project.	fullPath, projectID	fullPath
CVSFile	A representation of a file in the CVS that belongs to a particular project. A CVSFile resides in the Project Folder of the project it belongs to. A CVS file can be either a folder or a file.	fileID, creationDate, isFolder, parentID, projectFolder	fileID
Version	A version is a copy of a file represented by CVSFile with some unique modifications.	fileID, number, comment, date, userDetailsStamp	fileID, number
Deliverable	A deliverable is a message that is delivered by the manager to the client for revisions. A deliverable contains files (one to many) and a description.	delivID, deliveDate, description, clientID	delivID
Asset	An asset is any creative designed by Vickers&Benson Production Studio. An asset can be a <i>document, image, PDF file, Power Point presentation, Stream Media file.</i>	assetID, name, path, metadata, creationDate, thumbnail	assetID

The relationships between the entities of the schema are described in the table below:

Relationship	Entities Involved	Multiplicities
Management	Manager, Project	A manager can manage zero to more projects. A project is managed by exactly one manager.
Belongs	Project, Queue	A project has exactly one queue. A queue belongs to exactly one project.
Request	Client, Project	A client can request one or more projects. A project can be requested by exactly one client.
Work	Designer, Project	A project has a team of one or more designers working on it. A designer is assigned to work on zero to N projects.
QueueContents	Queue, Task	A queue contains zero to N tasks. (A queue can be empty). A task resides in (belongs to) exactly one queue.
Location	Project, ProjectFolder	A project is associated with one CVS file location. A ProjectFolder contains only files that pertain to exactly one project.
ProjectContents	ProjectFolder, CVSFile	A project contains zero or more files. A CVS file belongs to exactly one project.
FolderContents	CVSFile (folder), CVSFile (file)	A folder contains zero to N files. A file belongs to exactly one folder.
Has	CVSFile (file), Version	A CVS file has at least one version. A version belongs to exactly one CVS file.
Conversion	Deliverable, Version	A version can be delivered more than once and therefore can be convertible into multiple deliverables. A deliverable may contain

		multiple files.
Revision	Deliverable, Client	A deliverable can be sent for a revision to exactly one client. A client can receive multiple deliverables for a revision.

Appendix K – Database Schema

```
set schema DAMS

create table User(
    userID      INTEGER not null,
    name        VARCHAR(30) not null,
    password    VARCHAR(8) not null,
    PRIMARY KEY(userID)
)

create table Employee(
    employeeID  INTEGER not null,
    isManager   BIT not null,
    PRIMARY KEY(employeeID),
    FOREIGN KEY(userID) REFERENCES User
)

create table Project(
    projectID   INTEGER not null,
    name        VARCHAR(25) not null,
    startDate   DATE not null,
    deadline    DATE not null,
    clientID    INTEGER not null,
    managerID   INTEGER not null,
    PRIMARY KEY (projectID),
    FOREIGN KEY(clientID) REFERENCES Client,
    FOREIGN KEY(managerID) REFERENCES Employee
)

create table Work(
    designerID  INTEGER not null,
    projectID   INTEGER not null,
    PRIMARY KEY (designerID, projectID),
    FOREIGN KEY(designerID) REFERENCES Employee,
    FOREIGN KEY(projectID) REFERENCES Project
)

create table Client(
    clientID    INTEGER not null,
    address     VARCHAR(100) not null,
    contactName VARCHAR(30) not null,
    phone       VARCHAR(20) not null,
    email       VARCHAR(40) not null,
    PRIMARY KEY (clientID),
    FOREIGN KEY(clientID) REFERENCES User
)

create table Queue(
    queueID     INTEGER not null,
    projectID   INTEGER not null,
    PRIMARY KEY (queueID),
```

```

        FOREIGN KEY(projectID) REFERENCES Project
    )

create table Task(
    taskID          INTEGER not null,
    priority        SMALLINT not null,
    deadline        DATE not null,
    description     VARCHAR(1024) not null,
    status          VARCHAR(10) CHECK (status in ('Created', 'Approved',
        'Pending', 'Cancelled', 'Completed')),
    queueID         INTEGER not null,
    PRIMARY KEY (taskID),
    FOREIGN KEY(status) REFERENCES Status,
    FOREIGN KEY(queueID) REFERENCES Queue
)

create table Asset(
    assetID         INTEGER not null,
    name            INTEGER not null,
    path            VARCHAR(40) not null,
    metadata        VARCHAR(100) not null,
    creationDate    DATE not null,
    thumbnail       VARCHAR(40) not null,
    PRIMARY KEY (assetID)
)

create table ProjectFolder(
    fullPath        VARCHAR(40) not null,
    projectID       INTEGER not null,
    PRIMARY KEY (fullPath),
    FOREIGN KEY(projectID) REFERENCES Project
)

create table CVSFile(
    fileID          INTEGER not null,
    creationDate    DATE not null,
    isFolder        BIT not null,
    parentID        INTEGER,
    projectFolder   VARCHAR(40) not null,
    PRIMARY KEY (fileID),
    FOREIGN KEY(parentID) REFERENCES CVSFile,
    FOREIGN KEY(projectFolder) REFERENCES ProjectFolder
)

create table Version(
    fileID          INTEGER not null,
    number          SMALLINT not null,
    comment         VARCHAR(1024) not null,
    date            DATE not null,
    userDetailsStamp VARCHAR(40) not null,
    PRIMARY KEY (fileID),
    FOREIGN KEY(fileID) REFERENCES CVSFile
)

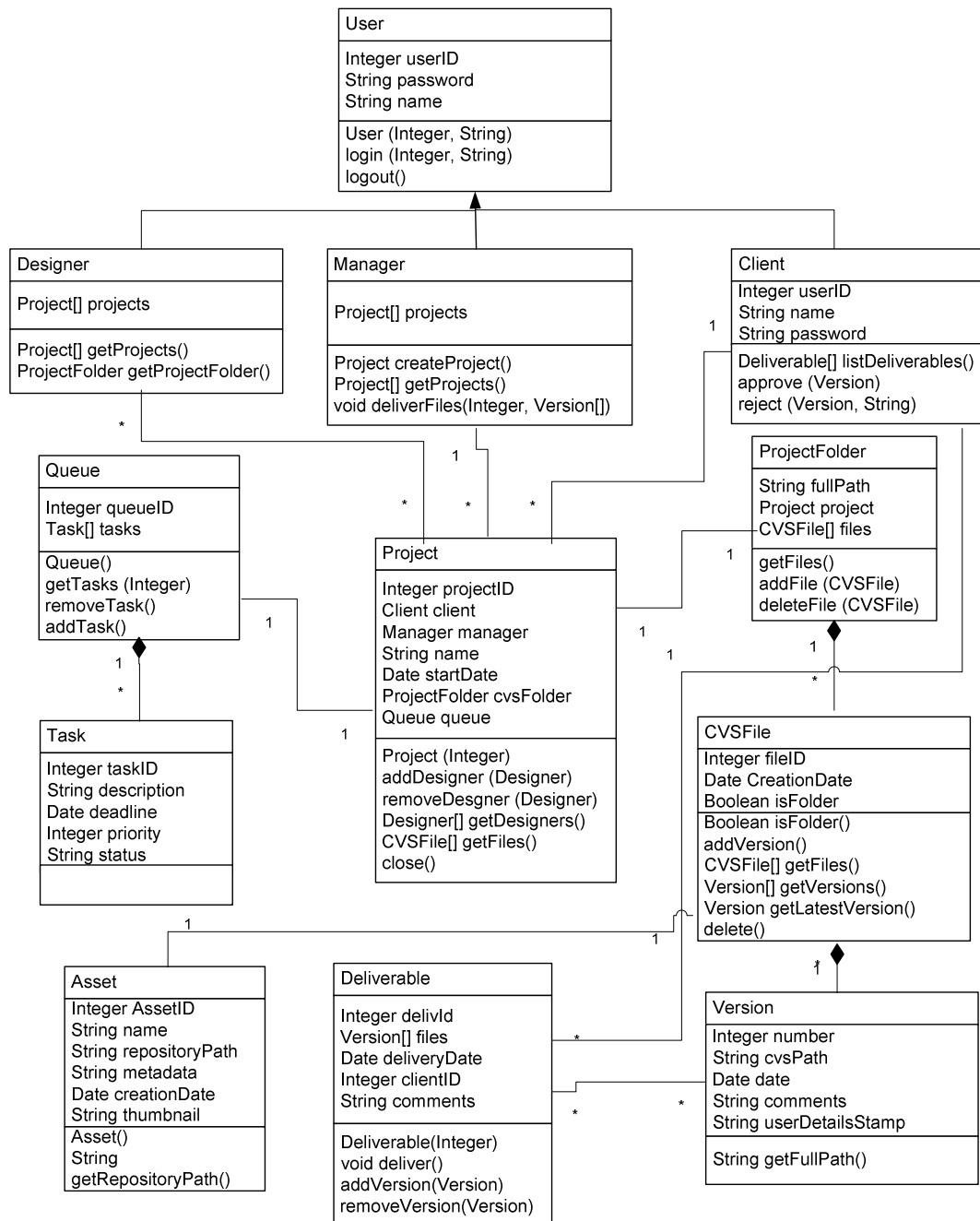
create table Deliverable(
    delivID         INTEGER not null,
    delivDate       DATE not null,

```

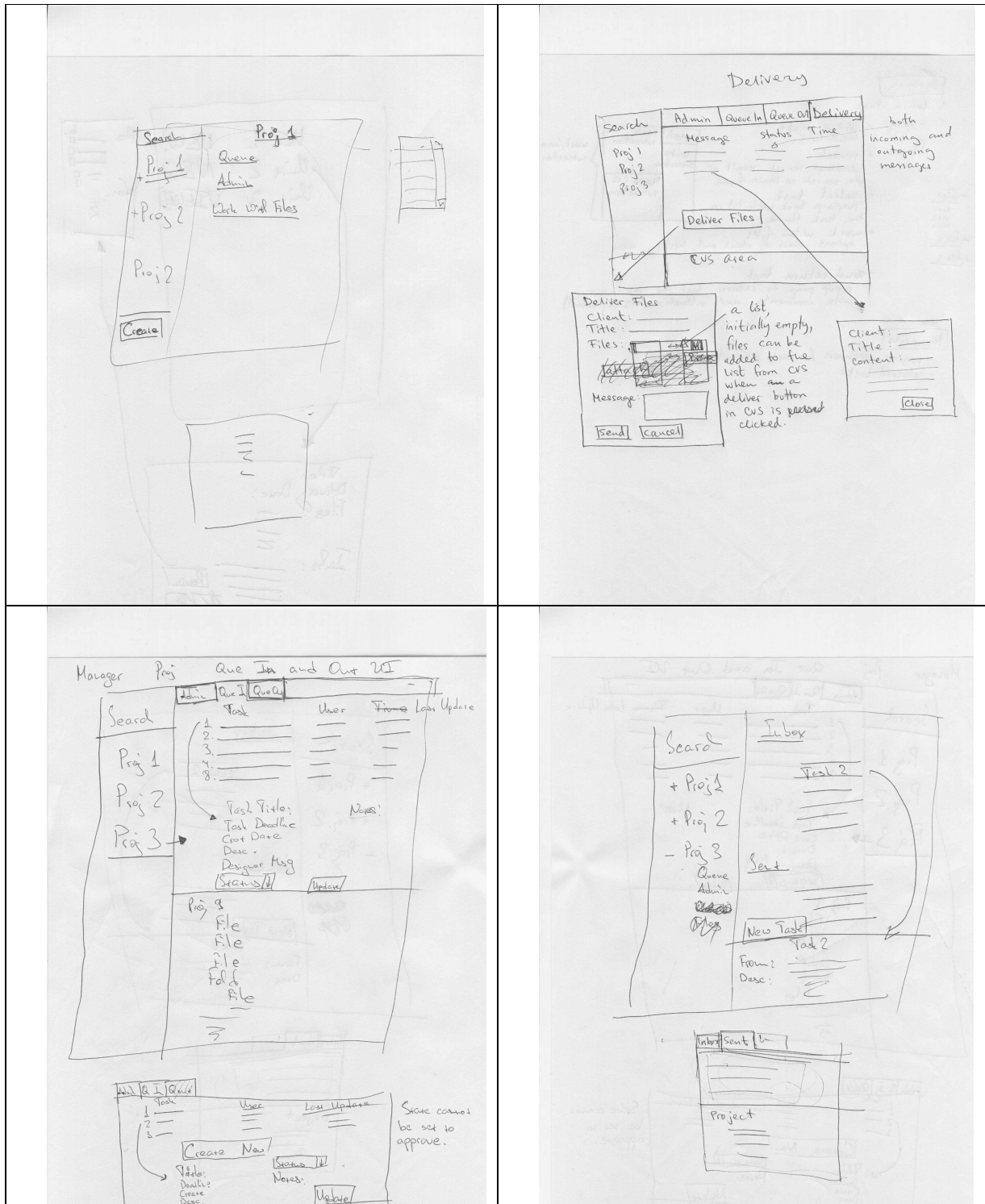


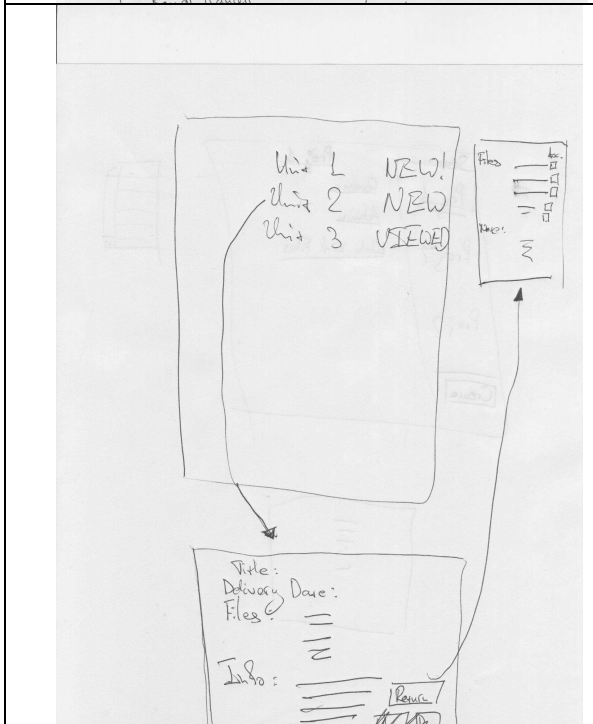
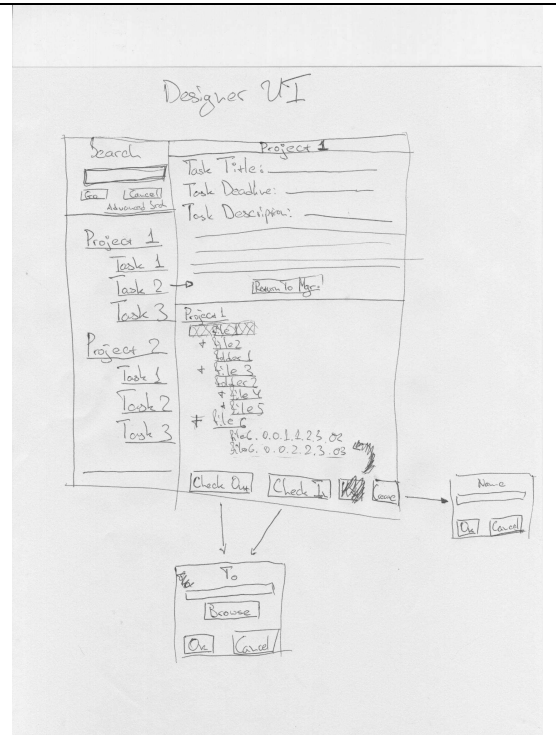
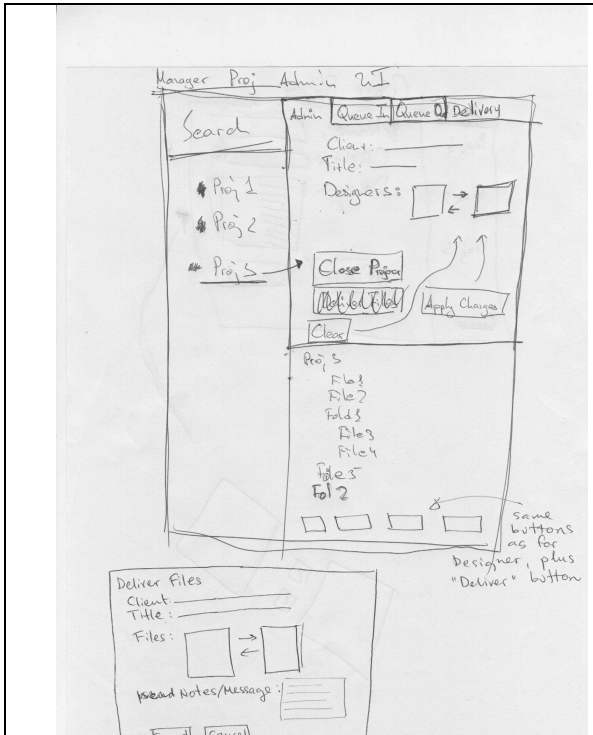
```
clientID    INTEGER not null,  
PRIMARY KEY (delivID),  
FOREIGN KEY(clientID) REFERENCES Client  
)
```


Appendix L – Class Diagram



Appendix M – Preliminary GUI Design





Appendix N – Functional Requirements Summary

The following is a summary of functional requirements for the system listed from actor standpoints.

Actor M – The Manager

M.1 – Project Creation

M.1a – Specify initial project information (title, client, description, etc.).

M.1b – Specify project file structure (create project folder, inject existing files).

M.1c – Assign Designers to project (a queue is created that is associated with the project, each designer has an interface to the queue through which they receive tasks from the manager, the manager has one queue for the project through which he receives tasks back from all designers for Quality Control).

M.2 – Project Completion

- M2.a – Create tasks (enter task descriptions, relevant file locations, deadlines).
- M2.b – Assign tasks to Designers (tasks sent to designer queues for completion).
- M2.c – View tasks (view tasks in progress that reside in designer queues, view tasks that are awaiting approval or cancellation).
- M2.d – Approve tasks.
- M2.e – Send tasks back with revisions (specify additional information, request changes, redirect task back to designer).
- M2.f – Cancel tasks (terminate tasks prior to their completion).
- M2.g – Create new documents within Version Control System.
- M2.h – Check out documents from Version Control System.
- M2.i – Check documents into Version Control System.
- M2.j – Remove documents from Version Control System.
- M2.k – Assign/remove designers to/from project.
- M2.l – Send files to client (prepare description for client, flag necessary files, make files available in client area).
- M2.m – Receive files from client with comments (view revisions).
- M2.n – Quick search for assets.
- M2.o – Advanced search for assets.

M.3 – Project Finalization

- M3.a – Import project assets into repository.
- M4.a – Close project (send project files to archive, remove from active projects, and remove designer queues).

Actor D – The Designer:

D.1 – Project Completion

- D.1a – View pending tasks for each active project Designer is part of.
- D.1b – View completed tasks for each active project Designer is part of.
- D.1c – Return tasks to Manager for Quality Control (add notes and descriptions to existing task).
- D.1d – Return tasks to Manager for Termination (specify reasons for termination).
- D.1e – Quick asset search.
- D.1f – Advanced asset search.
- D.1g – Create files in Version Control System.
- D.1h – Check out files in Version Control System.
- D.1i – Check in files into the Version Control System.

Actor C – The Client:

C.1 – Project Revision

- C.1a – View delivered files for active projects.
- C.1b – Approve delivered files.
- C.1c – Send files back with revisions (specify revisions).

Actor A – The Administrator:

A.1 – System Administration

- A.1a – Add/remove users to/from the system (Clients, Managers, and Designers).
- A.1b – Import assets from external sources (single and batch import).
- A.1c – Perform file backup.

Appendix O – Studio Hierarchy

Title	Description	Salary
Studio Manager	<ul style="list-style-type: none"> • Staffing(Retention, Reviews, Individual Growth Plans, Training Operators) • Finances(Budget, Revenue, and Profitability) • Hardware/Software(Leases, Upgrades, New Equipment) • Resources and Project Allocation • Quality Control • Studio Supply Inventory • Daily Archiving and Backup • Quoting • Billing • Proofreading 	\$50-\$70K
Senior Operator	<ul style="list-style-type: none"> • Day-to-day Assignments(Layouts) • Work with Creative(image files) • Accept Traffic Revisions • Double Check Revisions • Mentor Operators • Research and Acquisition of new skills • Train operators(new skills, upgrades to existing skill set) 	\$45-\$60K
Intermediate Operator	<ul style="list-style-type: none"> • Day-to-day assignments • Work with Creative(image files) • Accept Traffic Revisions • Double-check Revisions 	\$35-\$50K
Junior Operator	<ul style="list-style-type: none"> • Day-to-day Assignments • Accept Traffic Revisions • Operator Support 	\$22-\$35K

Figure E.1 - Vickers & Bensons Arnold Studio Hierarchy

Appendix P – Preliminary Meeting Summary

Preliminary Meeting between Group and Fil Magnoli(head of IT department at V&B Arnold)

This document summarizes the results of a preliminary meeting held with Vickers and Benson Arnold Inc. on Jan. 14 regarding the possibility of my team performing an analysis of a digital asset management system required by the company.

The two hour meeting was held between Sergei Iakhnin and Fil Magnoli(head of the IT department at V&B Arnold Inc.) and produced a multitude of general information describing the system, it's intended users, possible budgets and project delivery timelines as summarized below.

List of Interview Questions

1. Describe in general terms the proposed system.
2. Who are the principle clients/users?
3. Who (if any) are the secondary users?
4. What is the main (intended) functionality of the system?
5. What is the level of necessity for the system?
6. What are the budget constraints?
7. What are the time constraints associated with this project?
8. How are the tasks the system is intended for being carried out in the company at present?
9. Is the production of this system an initiative of the management or clients (users)?
10. What previous attempts were made to solve the problem?
11. What prevented an earlier implementation of the system?
12. What existing technologies in the company support the new system?
13. What existing technologies in the company may interfere with the new system?
14. Is the implementation of the system likely to affect the number of people currently employed at the company?
15. Is the system likely to significantly alter the current working environment of its intended users?
15. Is the system likely to complicate or simplify the current business process?

Summary of Obtained Information

N.B. The meeting took place as more of a free flowing discussion rather than following the exact ordering of the questionnaire above and the summary will be presented in paragraph or point form as needed.

Vickers and Benson Arnold Inc. is a large Canadian based advertising agency with two offices in Toronto and one office in Chicago. The information system in question was requested by the main office in Toronto which employs around 200 people and is located at 1920 Yonge st. at the corner of Davisville. The company has recently changed ownership and was bought out by Vivendi Universal which resulted in several changes to company organization. The proposed new system is a result of these changes and is intended to be a first step in establishing a project workflow information system within the company.

The required system is intended to be used by the production studio in the company. Graphical artists and art directors within the studio work with large collections of images, video and audio that are used in various advertising campaigns. All data is currently stored on individuals' workstations and shared between users through a system of public access drop boxes on these machines. At monthly intervals data is recorded onto DVD discs for storage and backup purposes. The current setup introduces a significant amount of redundancy and confusion within the studio file system and people often find themselves searching for a current version of a certain file or are faced with multiple versions of the same file. Since most files are production quality images they are frequently over 100 Mb in size and when multiple copies of a file are present introduce a heavy toll on the file system.

A further challenge is introduced when a campaign is completed and needs to be sent to a print shop for final print. Print shops require that files be in certain formats and adhere to certain specifications before they are sent to the shop via FTP. Preparing files in this manner is often a tedious and confusing task and errors are frequent.

The system required by the company should deal with both issues described above in that it should provide the studio employees with

the ability to manage and share their files easily and effectively with respect to both time and space, and also act as a content delivery system by helping its users in preparing and sending completed campaigns to various print shops. The exact utility of the system is at this time unclear and will require further interviews with people managing and working at the studio to determine.

The studio currently operates on Macintosh computers each of which has access to a Windows 2000 file server, however at later stages the system may need to be extended to also support PC workstations. This cross platform compatibility requirement suggests a web browser based implementation as a likely candidate.

Several products, and groups of products, currently exist that provide various degrees of required functionality. The makers of these products include companies such as Adobe and Quark and these software systems are predominantly highly expensive and complicated to install and maintain. Several such systems exceed \$250,000 in price which is beyond what the company is willing to expend on the project (\$100,000-\$200,000) at present. This has prevented the company from obtaining the system in the past.

We will need to further investigate the products available on the market today as well as a possibility of in-house development (the company has a subdivision which acts as a web development shop), or perhaps a blend of both and give the company a recommendation with regards to the course of action they need to take and what returns they may expect on the capital invested in the production of this system.

I was also advised that it is the company's goal to ultimately install a project workflow management system across the company of which the system described above is to be the first part. The larger system will likely have a user base of more than 100 people (far exceeding the initial user base in the studio of about 20-30 people) and will be used by employees from several departments including accounting, marketing, copy writers, and possibly clients. It is the intent of the company to market the system to their clients as one that provides them with the ability to request and produce localized advertising campaigns. This would be appealing to large franchises such as banks, communication companies, automotive companies, and restaurant chains etc. which constitute a large percentage of the company's clientele (Bank of Montreal, Volkswagen, and previously MacDonald's). It is certain that the design of such a system is beyond our capabilities

as information analysts and architects as well as beyond the scope and time constraints of the course. However we do need to keep this ultimate goal in mind in designing the smaller system in order to prevent introducing anything that may obstruct or prevent an implementation of the larger system within the company.

This preliminary meeting provided a large amount of information about both the company and the problem at hand. This information will be used extensively in our research. Consequent meetings with company staff should help us further define the problem and possible solutions. There seems to be high level of enthusiasm within the company associated with this project which should prove very useful in obtaining internal resources to aid us in completing our project.

Appendix Q – Email Questionnaire

The following questions were sent to Vickers & Bensons Arnold by email to be answered by the Studio Manager and Senior Operator at the studio.

1. Briefly describe the infrastructure of the studio (position titles, short job descriptions, approximate salaries if possible).
2. Briefly describe current project workflow within the studio (how are files shared and transferred between employees, what is the typical life cycle of an image file or other files relevant to the project, how are the files belonging to a particular campaign or project organized, stored and managed).
3. Describe some problems within the existing system.
4. Describe some of the goals the project is intended to achieve.
5. Describe some of the time and budget constraints involved if you are aware of them at this time.
6. What amount of time is generally required to locate and retrieve a particular image or video file?
7. Are files frequently shared between several ads (same image used for different posters for instance)?
8. How often is the data backed up in the studio?
9. Are files ever lost?
10. Outline any information that you are aware of that may aid us in locating suitable solutions for the problem at hand.

This reply contains the input of the studio manager on questions #4 and #10.

DAM Brief

Key Requirements

Working Process

Briefing

- Electronic Creative Request form
- Briefing meeting when required for mid-size projects

Creative

- Criteria Questionnaire to determine vb&a vs Xpress suitability

- PDF creative presentation with phone call presentation
- Dedicated FTP for online creative revisions and approval

Invoicing

- Client estimate approval
- 2 sets of client revisions before additional billing
- e-tool invoicing

Digital Asset Management

- Implement Digital Asset Management system to store and access electronic assets
- Images thumbnailed and catalogued, viewable from a web-based interface
- Individual assets searched and retrieved through key words
- Complete cross-platform compatibility - Flexibility across Mac & PC
- Assets stored in divisional categories and cross indexed for maximum utility
- Images could be flagged with expiry dates
- Liquidity - files must be in a form and of a type that can be easily used and reused
- Reusability - for different purposes.
- Scalability - capacity of a system to handle future growth
- Direct data connection with major clients to handle daily communication and final delivery of material (FTP site, or a QPS style Asset Management system)
- Transfer of files through email
- Files can be easily searched, viewed, selected, ordered or downloaded, updated and/or converted to different formats for multiple uses.
- Files can be searched by key words, creation date, file format, or project assignment, and can be reviewed in a variety of ways from within your browser window.
- Reside on dedicated servers and protected by security features that restrict access by specified users to specified assets

Operational Requirements

- Approval Process
- Presentation, revisions and approvals managed electronically through Acrobat pdf (editable PDFs that support electronic signature sign-offs)
- Revision communication through annotation feature and telephone, on-line with passworded electronic signatures entered on electronic approval stamp
- Contact annotates PDF and then file is automatically fwd'd to next superior and so on
- Status/Task Function – able to route work thru status and forces flow
- Status Function to be accessible by CSR and Admin and Manager

- Hierarchical Revision flow – Boss sees last and can override or modify previous revisions
- Automated version code of document
- Progression/Status Indicator interface indicates version # and where document is as and how long it's been there – ie, v2 has been with client for 3.5 hours waiting to be picked up, or waiting for comments, etc
- Submission of CRF form should automatically generate billing to the client (rate card based)
- Can version 3 (where revisions are no longer included in rate card) be auto flagged as being an additional charge? CSR/Director must have capability to over-ride, with explanation
- Check-in, check-out feature
- Priority and deadline management tools – automated workflow and job tracking which enhances production by triggering next steps of production cycle and monitoring job status from start to finish.

Time Reporting and Invoice Functioning Requirements

- As long as a linked document is opened (and they should all be linked), time is automatically entered to that docket. Q: what to do during travel times???
- V3 and up must be more closely time tracked as these hours would be charged additionally
- DBase of typical hours for specific projects (ie 4 panel brochure) – the rates would be averaged out and once average reaches $\pm XX\%$ estimated hours, the rate is flagged as being eligible for revision. This must be client specific, as on overly needy client cannot affect the rates of an easy to manage client
- Time Track by Function

Workflow - detailed

SSR Assignments

- If SSR, LOB/ client will fill out CRF (Creative Request Form) together – supported by Product Profile for Mid Size Assignments
- CRF is full electronic, transmitted to SSR Traffic Coord/SSR Manager (but accessible by all)
- SSR Manager/Coordinator verifies project is SSR appropriate –
- If SSR Assignment, SSR Manager/Coordinator determines if Small or Mid Size and places in appropriate “electronic bin”
- If not an SSR Assignment, SSR Manager/Coordinator to contact personnel at vb&a or vbdi who will contact LOB/Corporate Marketing to discuss.

Small Size Assignments

- Next available Designer picks up job from “electronic bin” (CRF is substantial enough for Designer to begin w/o any additional instruction)
- Financial Writer QC's Mechanical***

- Coordinator/Manager PDFs Mechanical to client, Designer get copied
- Clients annotates PDF and returns to Coordinator/Manager

Mid Size Assignments

- Goes to CSR based on Client
- CSR would vet CRF, call Client for additional info if required
- CSR completes Content Outline which client approves electronically.
- CSR works with Designer to complete Mechanical (CSR proofreads)
- Financial Writer reviews Mechanical for copywriting and brand consistency, edits & revises as required.***
- Coordinator/Manager PDFs Mechanicals to client, Financial Writer/CSR/designer get copied
- CSR (or Manager) reviews Mechanical with Client LIVE or Near Live or client annotates PDF and returns to CSR/Manager
- if minor revs req'd CSR completes revisions LIVE with client and obtains final Approvals electronically OR
- if major revs req'd LIVE conference (on-line meeting) req'd bwtm CSR and/or Designer and/or Financial Writer AND
- Loop back to ***

Forms/Criteria/Descriptions Required

- Product Profile – Client or product Group – maintains and updates as necessary whenever a new project begins – has foundation of product,
- CRF Creative Request Form – including project specific forms for heavily templated projects, ie Announcement, Poster,
- CRF needs entire list (email addresses) of personnel who need to approve project – these must be listed in a hierarchial order
- CRF must have PO#
- Decision Tree - Criteria Checklist for vb&a, vbdi, SSR, Strategy Req'd or Not?

Parking Lot

- Who pays for film house downloads that tax the system?
- Compensation needs to factor in time spend on Browser
- Do we use Filemaker to connect with Workflow System, export data on a daily basis and import into DDS?
- Templated Jobs - Are format specific CRFs linked to creative via input fields? Ie when client enters "Date" "Time" "Place" on Announcement specific CRF, does data get auto entered into Quark doc??
- Is there one mass in-bin? Or does Traffic Coordinator sort and place in individual bins (ie, Writer, Designer, Production, QC). Naturally, everyone will need access to all files, in case TC doesn't have time to sort.

- Business forms (CRF accounting, etc) reside on separate server from assets

This reply contains the input of a Senior Operator on questions #1 to #10.

>1. Briefly describe the infrastructure of the studio (position titles, >short job descriptions, approximate salaries if possible).

1 Studio Manager \$50-\$70K

Staffing (Retention, Reviews, Individual Growth Plans, Training Ops)

Finances (Budget, Revenue & Profitability)

Hardware/Software (Leases, Upgrades & New Equipment)

Day to Day running of Studio

Resource & Project Allocation

Quality Control (revs)

Studio Supply Inventory

Daily Archiving and Backup

Quoting

Billing

Proofreading

1 Senior Operator \$45-\$60K

Day to Day Assignments (Layouts)

Work Directly with Creative

Accept Traffic Revisions

Double Check Revisions

Mentor Operators

Typographical Excellence

Acquiring New Skills (ie Pre Press)

Train Operators (upgrades, new skills)

Studio Operating Standards

3 Intermediate Operators \$35-\$50K

Day to Day Assignments

Work Directly with Creative

Accept Traffic Revisions

Double Check Revisions

2 Junior Operators \$22-35K

Day to Day Assignments

Accept Traffic Revisions

Operator Support

>

>2. Briefly describe current project workflow within the studio (how are

>files shared and transferred between employees, what is the typical

>life cycle of an image file or other files relevant to the project, how

>are the files belonging to a particular campaign or project organized,

>stored and managed).

- All work comes through the Studio Manager, from a limited number of designated "traffic" people - this allows Manager to better prioritize work.
- All operators work off a server, sharing access to active files. The server is backed up daily.
- Every 6 weeks, the server is "cleaned off" and material is permanently archived on Retrospect - CDs
- Typical life cycle can be days or weeks or even months - varies by client and project
- All files relevant to a specific job are kept in a folder identified by the job/docket number. The Quark file (the layout or mechanical file) is usually titled with the same job/docket number. Other files - images for example, are kept in the job folder, but not identified by the project.

>

>3. Describe some problems within the existing system.

- If server goes down, nobody can access files. Doesn't happen often, or for a long period of time (say approx 15minutes). Usually maintenance is completed at night.
- No modification history - especially bad for images
- We have no way of assigning image rights to a file (for eg, is it client owned, royalty free, licensed for specific time frames or media, etc).
- We can send PDFs to clients for approval, but they cannot annotate changes, nor can they sign off electronically. PDFs usually get forwarded to traffic or account services, who manually forward to clients - we can't track status of the PDFs.
- Time sheets have to be entered manually; billing is done manually
- Retrieving material from the archive is difficult - in the past the Studio used a different job numbering system than the agency. Although that's now been resolved, when staff ask for files, they often don't know the job number, so it's very difficult to track material.
- Often staff ask for everything on a client to be retrieved because they don't know what they're looking for - it would be nice to see thumbnails, so we can retrieve only what's really needed
- PC vs Mac sometimes is an issue.
- Low Res images in Quark have no direct link to their Hi Res counterpart

>4. Describe some of the goals the project is intended to achieve.

- Resolve above PLUS

• Assign a pre-determined route for PDF approval, that's based on client's hierarchy, so one file gets passed from staff to boss, and the boss can override previous annotations. • Through the pre-determined route for PDF approval, we need to know status of PDF at all times • Clients should receive e-mail or other notification when a PDF requires approval • Automated client billing based on rate card • Detailed, automated client billing after PDF 3 (after 2 sets of revisions), with option to override • Priority and deadline management tools

>

>5. Describe some of the time and budget constraints involved if you are

>aware of them at this time.

• Budget is always an issue. Timing is more flexible. We should consider a few options: 1. All out everything now 2. Software that covers the basics now, and has additional modules or can be customized to meet some less urgent requirements in the near future (1-2 years). • Less urgent requirements include time tracking, automated billing functions (rate card or additional revs) and pre-determined route for PDF approval.

>

>6. What amount of time is generally required to locate and retrieve a
>particular image or video file?

5-10 mins if job number supplied. - if not, could be hours of searching

>

>7. Are files frequently shared between several ads (same image used
for

>different posters for instance)?

Yes - this happens quite often. Keep in mind that different sizes/resolutions will be required for different applications.

>

>8. How often is the data backed up in the studio?

Daily from server

>

>9. Are files ever lost?

O yah, but it rarely happens - last time in 1999.

>

>10. Outline any information that you are aware of that may aid us in

>locating suitable solutions for the problem at hand.

Think that covers it!