Chinese University of Hong Kong

Computer Science Department

Final Year Project Term Paper

Topic: Entertainment Information System using CORBA

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Entertainment Information System using CORBA

Abstract of the project

Personal Entertainment Information System (PEIS) is providing the entertainment information such as movie news, preview, listing, TV listing, music album news. In market now, there are many entertainment information available on the Internet from many big broadcasting media companies. In Hong Kong, some websites also provide such services. The main features of this system are the personalization, and the multimedia delivery engine. The setting of this paper will be as follows. First, about 10 pages will spend on the introduction, such as the detail description of this system, the literature study and the impact of this system to the society. Second, about 10 pages will be used to describe the system design. Then 20 pages will be on the description of the system specification. Last, 10 pages will be used on the preliminary implement notes

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Introduction

Brief Description of the entertainment system

The entertainment system has the abilities to delivery the up-to-date entertainment information to the users. The entertainment information is mainly on three areas now. The first one is the movie information. The information includes, the movie listing, box office rank, the ticket selling information, the movie review clip and related news. The Second one is the Music information. In the market, there are different styles of music. The music information will include the music record information, purchasing information and their music preview clip. The third one is the TV information. In US, the channels available for the domestic are enormous, the need of the TV listing is urge for them. Besides, they need some commentary on what is good on the TV. In Hong Kong, the demand of the TV listing and information is not as urge as the US. However, since there are about 25 channels in Hong Kong, it is welcome by most people to have a TV listing telling them what is good tonight.

Besides the domestic users, this system will be targeted for the media content provider. This system will be design to be reusable, scalable and customizable. That means that when a media content provider wants to adopt this system. The only things require to do is to re-design the Layout object and Data connectivity objects. For personalization and content delivery modules, they will be designed to be reusable. This system may save time for a Media companies to build a personalized content web site on their own.

The last target user groups of the system are the film makers and film buyers. The system will be modified to let the film makers to put their film on the system. The film buyers can search, browse those new films through the system and they can make deal on system to buy the copyright of the films.

There are three technologies being used and adopted in this project. They are the
CORBA, Personalization and Multimedia Content Delivery.

**CORBA**

The system will be implemented on CORBA platform. CORBA is Common Object Request Broker Architecture. It is a new and famous distributing system model nowadays. It allow the system components built on different platform and language. Besides it has many built-in services, such naming services, multi-threading, and load-balancing.

**Personalization**

Personalization is a critical tools for most of the web sites which provide enormous information. The project will try to demonstrate the power of the personalization for individual client. In the project, the demonstrated system will use several personalization techniques to do the customization for the users. The users can received a tailor made content and design when they login to the page.

**Content Delivery**

Content Delivery means a special channel or facility to let the client having the content whatever the type of the content is text, audio, or even video. For the text content delivery, the method is simple. The project will adopt HTML or XML. For the Audio and video, in order to provide better quality, the real-time protocol will be used to let the users to get the streaming content.
Similar projects around the world


These web sites are the two major movie information databases in Hong Kong. These two web site have similar content. They have the current movie preview and commentary. Besides, they have the upcoming movie schedule and movie previewer. They also have the box office of the movie available in Hong Kong. Last, they provides some game, member corner, movie stars’ picture and news.

**British Sky Broadcasting**

The company use CORBA to build a entertainment system. This system contains the Sky’s channels schedule, program information news, and some mini games. There are text, video and audio information from them. Besides, they have some addition functions to facilitate the users such as searching, and personalization. The web site is built by IONA’s Orbix for CORBA platform, Oracle for the database, Java for the programming and JSP for the web interface.

**Entertaindom.com**

This web site is launched by Time Warner. It mainly provides the entertainment information, such as entertainment news, music charts, movie listing, box office number, TV listings, rating and some other games. It also built the virtual community in the web. The feature of this web sites is that it provide several online program.
Technology Impact

Problems solving

The impact of this system is only solutions of the existing problems. In the Internet, it exists two major problems. First, it is the growth of information is too fast such that the available information on the Internet is booming. Thus, some of the information becomes noise to the Internet audience. This problem is called information overflow.

The next problem is the E-commerce platform. E-commerce is one of the famous topics in the Information Technology Industry. The technology of the E-commerce is quite mature now. However, there are not much good E-commerce model on the market which can be better than the traditional commerce. In the later section, the benefit of system to the e-commerce will be discussed.

Information overflow

In the Internet world now, there are lots of information. People are hardly to get their relevant information from the Internet. Even they use the search engine or portal, they can’t get their favor information. Moreover, the information from the search engine and portal is so much that they can simply show one or two pages to list out the information. They common will show the information hierarchically or page by page. For the hierarchical method, the user can get into their favor information by this requires many overheads on showing the hierarchy pages. Besides, these hierarchies are done manually. For the page by page method, the user may have the chance to get its information on the first pages, but probably some important information will be put in the later pages and thus user will lost some of their information.

To solve this existing problem, the personalization is adopted to these web portals and also this project. How the personalization help in the problem of information overflow. First, the system will summarize a most fit page for the
users. The pages will be much more less than the pages in the portal since each user won’t digest too much information. They just want to read their most favorite information. If all the important information is put into one pages. This can save in many ways. First, the download time of the page is saved since the personalized pages are much slimmer than all information available pages. Second, this can save the number of user request. Sometimes, the users require to click several pages, http requests, in order to get their relevant information. If these requests are fewer, the congestion of the web server can be solved. This also save the time of users to get their information since the time of retrieve one page will is much shorter than retrieve three or four pages.

Facilitate the E-commerce

The personalization entertainment information system can be as a front end for those who want to do e-commerce related to the entertainment. For example, a online movie selling system. This system can provide the online transact to buy the movie ticket. Through this system, user can choose when to see the movie, and which Theatre that they will go to. Besides, they can choose their own seat. With this system, the theatre can save the number labor in their counters to sell the ticket and this can stimulate the utilization of the seat. This is because when there is no available for a particular time slot, the users can choose another time slot other than don’t choose any.

However, it has one big problem. This system cannot attract people to go in and buy the tickets. With this system, the online transaction web site can make use of the system to provide the movie information and news to attract the users. Since this is a information system not a buying system. This can attract the client to go in more frequently. Besides, the personalization can help the companies to know which group of users are they royal customers. They can also identify the customer in order to do some direct market.
Commerce Impact

For the commerce, the system can be applied in three ways. First, the system can be migrate to adopt the content provider database for helping their set up a similar system. Second, it can applied to Business to Business (B2B) E-commerce model, such that the system because a marketplace for gathering the buyers and sellers of the entertainment resources. Third, trivially, the system can be applied to Business to Customer (B2C) E-commerce model. That is the system will be the front end for the entertainment seller to sell their product to their target customers. It also provides a good place for the people who want to entertainment to shop around.

Technology Provider

In this high-speed Internet era, most of the commerce institute cannot keep the pace with the technology. Most of them have the idea but not the technology. This system can help the old fashion media companies to put their contents from the paper, Television or radio to the Internet in order to keep their competitive with others.

How to applied the technology to these companies. Since the system is built by the CORBA, and Java. One of main features of CORBA is that it is a distributing platform and can support different machines. That can help the companies available to setup without buying some new machine. Besides, the language used in the system is Java. The characteristic of Java is that it can write once, run anywhere. That means Java are machine-independent. If the system develop under Windows NT environment using Java, it can be ported to Solaris without any changes other system program. Besides, this system can provide a web-based client interface for the user to retrieve the content. However, this system is not a total solution, the user of this system need to customer the data connectivity and the user interface part.
B2B E-commerce model

In above, it is said that this system can be applied on Business to Business E-commerce model, how can this be done? What is the philosophy inside. Business to Business E-commerce model means the transactions between companies are done on the Internet. In the current market, the movie, VCD, CD are purchasing through the traditional buying process, such as the making the purchasing order, receive the sale order, etc. This kind of process waste lots of time, labor work and administration cost. With the rise of the E-commerce, this kind of workflow are gradually replaced by the e-commerce model, which is the ordering and transaction of the products can be done online. This means those cost can be saved and thus the profit margin is increased.

This system can be the bridge between the content resource providers such the film makers, the music producers, the VCD manufacturers and TV producers and the business content consumers such as the cinemas, the music record shops, the VCD shops and TV producers. When the consumer come to this system, they can know the latest information available on the world. For example, a music record shop boss login to this system and find that the latest album of Jack Cheung will release next month, and he want to order 50 packs for his shop. With E-commerce modules added to the system, he can make a pre-order to the supplier immediately. In this case, both the shop and the supplier will be benefit. For the shop, he can start pre-order the popular CDs. For the supplier, they can estimate more precisely on how much pieces to be produced.

Another Case, a local cinema, the film buyer of the cinema looking for the films around the world to show on his cinema. If he look into the system, he can find out the up-to-date movie on the system and view the preview clip of the movie. If he find that the movie is suitable for his cinema, he can make the order directly on the system.

Last Case, TV broadcasting company in US want to open a channel for the local Chinese. They want some of the programs in this channel are from some soap drama produced in Hong Kong. This system can provide the TV listing information in Hong Kong. Like the movie, there are some preview clip for the people to view, once he think that program may be good for his company. He can start making deal by the retrieve more information from the TV producers.
B2C E-commerce model

In the introductory part of this section, this system can be said to support the Business to Customer E-commerce model. The business to customer e-commerce is talking about putting tradition-retailing shop on the Internet. That means people can see the product catalog and buy thing on the Internet. One of the famous B2C e-commerce is the Amazon.com. Amazon.com is the online bookseller which the largest one in the world. It first provides books for selling. Recently, it has much more products such as MUSIC, Video, electronics, etc to be sold.

How our system work on the B2C E-commerce? First the system will provide the user a customized page to view their most favorite information after they login. The information contains the related product information. For Example, a user login to the system, there is a summary of the latest romantic movies for him. Then the user may click to see the detail of one of the latest release. Then system will guide him to the ticket selling corner to buy the tickets. Besides, as there is many clients’ information in the system. The cinema can provide some promotion plan for the frequently customers in order to keep their loyalty.

For the Music information, after the user login to the system, he can got his personalized information. The user can view the music chart from the broadcasting media in Hong Kong. Also he can see the latest release of the music on the marketing. He can also listen to the preview of the music. When he is interest to buy the music, he can view the price and the detail. He can also buy it online and get the CD at home.
System Design

Design goals

In the system, several goals will need to be achieved. The goal are as follows:
First, the system can able to store any entertainment information.
Second, the system can adopt to any exist database.
Third, the system can do personalization.
Fourth, the system should have able to delivery the real-time content.
Fifth, E-commerce module can be added to the system
Sixth, Data mining module can be added to the system.
Seven, the system can be scalable and re-usable.

Can store any Entertainment Information

In order to make the system a entertainment information system, it should be able to import any entertainment information. Otherwise, the system cannot say to be a entertainment information system. If the system can only contain the movie information, it is only a movie database.

The entertainment information include the following item:
1. Movie information such as movie title, schedule and box office....
2. Music information such as CD title, songs listing and price.
3. TV information such as the TV schedule, TV program detail, etc.
4. Video information such as the Video title, the video content description, etc.
5. Game information such as the game title, the system requirement of the game.
Able to connect any entertainment information database

Since there are much information around the market, it is impossible to maintain the information from one database. Probably, the information may be from the different databases. For example, there is one database for the movie data. Another database is storing for the music data and one database for the TV information.

Besides, to enrich the information available on the system, it is a trend to connect the system from the movie provide and content provider. Thus, the system may be design to be connect to different relational database management system, such as Oracle, Sybase, or SQL server. This is because different information providers may use different database. Besides, there will different in the database schema among different information providers. In this case, the system should have a common schema which suit all the related schema.

Able to do personalization

Personalization is a need to improve the relationship between the clients and the system. Most information systems on the Internet are same among different users. However, most of the users want its own layout such the position of the information component, the theme color, and the background of the pages. Besides, most of these web sites require the users to click many time in order to view their information. When they enter the web sites next time, they are required to repeat the action again. It is quite un-user friendly for most people. Therefore, personalization should be done in the system in order to increase the hit rate of the system.

Able to delivery real-time content

For much entertainment information, it contains the multimedia content such as the text data, audio data and video data. For the text data, the system can delivery in the normal way, such as using the TCP/IP or HTTP to deliver the data to the client. However, for the audio and video data, these two kinds of data are time critical data. If the system deliver the whole data files, the clients require to wait until the whole data file download to their system. This method is quite old fashion and not friendly
enough. The time to download such as video file is quite long. For example, a movie clip has about 10 MB, if the user 2.8 Kbps connection, he should wait for 50 minutes in order to view the movie. So, it is infeasible for many users. So, a real-time streaming of the multimedia delivery should be done.

**Able to add E-commerce modules**

The ultimate goal of this information system is to improve the E-commerce popularity. Without the online transaction, the information system will be not profitable. Since, the opportunity of making profile on the Internet is doing the E-commerce, the main goal of the providing those information is to stimulate the profile of the existing entertainment business. If the e-commerce modules is added, users can directly purchase the product once they find the product is good to them from the information.

**Able to do data mining**

In order to make E-commerce doing better, some data mining can be done over the system. With the data mining, the entertainment supplier can know the association between the product such that they can create some sale plan for their customers. Besides, they can identify the target groups for each of their product. This can help on deciding their market strategy. Last, the customer behavior can be mined from the system logged data. With the customer behavior, the company can do many actions such as sending some promotion plan to the users, some discount or special gift to their target users.

For example, the system analysed customer A like to see action, scientist fiction movie on the cinema, but like to see romantics, dramatic movie by buying the VCDs. Then, the company can make a promotion that give couples to buy the romnatics video for customer A if he has bought the action movie for three times, or vice vesa.

**Scalable and Re-usable**

The system is also aimed to be scalable and reusable. For the scalability, since there will be more and more information gather into the system if the system become popular. So the system should design to be scalable in order to meet the future requirement. The areas of the scalability is as follows:

i. The system is scalable on the type of entertainment information. Currently, the system is available to accept movie, music or TV information. However, in the
future, there may be much more entertainment information, which may attract the customer. For example, the video game is one of the popular entertainment events among the youth, it will be much popular in the future. Besides, there may be some video-on-demand services in the future after the broadband infrastructure is ready.

ii. The system is scalable on the location. Since the Internet is a world-wide connected network, every information on the Internet can be anywhere in world. As the system is built on the Web platform, the entertainment information can serve at different place around. Therefore, the system should be able to expand among the country boundary. For example, the data imported from Hong Kong, mainland China or Japan can be see around the world. The people around the world can access the product available to these countries through this system.

iii. The system is scalable on the language. As the final goal of provide the information services is to help the B2C E-commerce. Therefore, the language should be localized on the customer native language. For example, in mainland china, the people using the Internet may know very little English. If the product want to sell the them, the description and information of the product should be represent in simplify Chinese in order to persuade them to buy. This case will also happened to Japan, France, and those countries which native language is not English.
System Architecture

The system architecture contains several major components. Every component is doing different jobs. Each component can be viewed as a blackbox, where data is input and other data is output after processing. The data between the components will pass on the network.

Here is the list of the major components:
1. Database
2. Data Input Component
3. User Client
4. Server
5. Personalization Engine
6. Data mining Engine
7. Multimedia Delivery Engine
8. Purchasing Engine

The following diagram will show the relationship between these components:
Explanation of different components

Data Input Component

This component is responsible for the importing data from the external source to the system database. For example, it is used to replicate the database from a content provider such as the TV broadcasting corporate. This component require to turn different data from different source into the generic data table defined in the database.

Database

The database has the main role to store the data will be used in the system. The data contains of the following:

i. User data, the user data include the user login information, user personal information and user preference information

ii. Content data, The data is the data stored the information provide for the users of the system. The data include the movie information, music information, TV information and other available information.

iii. User access data, These data are used for doing the personalization and data mining. With these data, the personalization engine can derive the current user favor without ask the users again. For the data mining engine, it can track out the user behavior and also the cluster the group of user having similar habit.

Data Mining Engine

The data mining engine is doing the job to analyze and explore the new knowledge based on the logged user actions. It is responsible to mine the valuable knowledge from the user which can help in the sale of the products available by the services. There are some key information should be able to mined from the data miner. They are:

i. The relation between the age group and entertainment event

ii. The relation among the entertainment items for the client

iii. Which is the potential age group for the service?
Personalization Engine

The personalization engine is used to do the customization for every users. Every users have their own preference on the content they read, and the layout they read. The personalization can first entertain the requirements of the users to increase their loyalty to the service. It can also save the delivery time for the user.

Purchasing Engine

The purchasing engine is used for doing the transaction of the entertainment product or services. Itautomatictransmits the user purchase order to the supplier through the network after the user request to buy. The purchasing engine will than collect the feedback to the client whether its transaction is success or not.

Multimedia Delivery Engine

The multimedia delivery engine is used to delivery the time-sensitive content to the user. Time-sensitive content are video and audio content. The average size of these data are in term of Mega bytes, so it is not feasible for the users to download the whole file and then listen. Therefore, this engine is built to stream these data to the users such that they listen or see the content without waiting downloaded the whole content data.

Server

The server is used to talk to the client. For multimedia content, the client will communicate Multimedia delivery engine. For the common data, the control data or user data, the client is communicating with the server. Besides, it will handle the back end operation such as the logging of user action. To summarize, the server is responsible to do the followings:

i. Accept the client requests and do the corresponding job.

ii. Logging user actions.

iii. Trigger the personalization engine when the user logout to make the user interface being customized next time.
iv. Trigger the purchasing engine when the client want to buy somethings.

Client

The client is used to communicate with the user. The following function will be available by client:

i. It is able let the user to view the content available on the system.
ii. It can let the user to login
iii. It can let the user to customize their profile and layout
iv. It can let the user to buy some the product available on the system
v. The user can trigger the personalization of their page at any time.
The data flow of the system is as the above diagram. There are several connections between different components. The connections are:

1. Client to Server
2. Client to Multimedia Delivery Engine
3. Server to Personalization Engine
4. Server to Purchasing Engine
5. Database to Server
6. Data Input Terminal to Database
7. Data Mining Engine to Database

Client to Server

The connection between client and server are mainly for the request and response between the client and server. When the client request some service, the server will receive the corresponding request and return a response after it do the processing. When the user come to the service, it will communicate with the client. For example, the user login to the system, the client will receive the user
id and the password, then the user id and password will send to the server for the authentication and give a response to the client when the user being verified or not.

Client to Multimedia Delivery Engine

When the user request to see a movie or music preview, the user will listen or view these content while they are downloading. In other word, the multimedia content of the system is streamed to the user when it make such a request. Original data communication method is not suitable for streaming of the content. First, the multimedia content are nearly to be real-time, when the data transfer too slow, there will be some delay on the screen. Therefore, there is another protocol to support this kind of data communication in order to make quality of the streamed acceptable for the user.

Server to Personalization Engine

After the server receive the logout signal or the personalization command from the user, the server will trigger the personalization engine. The personalization engine will ask for the server for the data they required in order to do the personalization. The data they required will be the user profiles, user preference data, the user action is the last session and the user schedule. After the personalization process is done, the engine will send the result back to the server. The user can refresh to get it newly personalized pages.

Server to Purchasing Engine

When the user want to buy something on the system, for example, he want to buy a pair of movie ticket on the system. the user will send request to the server for making such a transaction. When the client do the transaction, he will first send his purchasing information, such as the product they are buying, the visa card no to the server. The server will verify the data and redirect to the purchasing engine if the data is valid. As the purchase engine will connect to the corresponding shop offer the product, the purchase engine will translate the purchasing information into the standard format and transfer to that system. Then, it will wait for the transaction complete. When the transaction complete, it will reply to the server whether the transaction is success or not.
Database to Server

For the diagram, it is found that the components are not connecting to the database. The reason of that is because of the generality. If too many components are connecting to the database, when the database is redesigned, every component needs to rewrite to suit the newly designed database. However, if the all other components are talking to the server, but not the database, the re-write of the components can be eliminated.

Then, what kind of data will be between the database and the server. The server will take care of any data. First the server will retrieve and send the user data to the database. The user data includes the user login data, user profile or user preference. Second the server will send the user action history to the database. Third, the server will send the personalization result to the database. Last, the server will retrieve the content from the database.

Data Input Terminal to Database

Data input terminal is responsible for inputting data into the database. Therefore, the data from the data input terminal are the content data. The content data are the followings:
1. movie information
2. music information
3. TV information
4. other entertainment information

Data Mining Engine to Database

Data Mining Engine will retrieve the data for doing the data mining. The data includes the user information, user history actions, user selected category and the purchasing information of user. After the engine processed the data, it will send the result back to the database to store, or it may report to a external application for the system administrator of the system.
System Specification

Overall System Detail

The overall system will base on the system architecture described in last section. There will be the data input terminal, the database, the server, the personalization engine, purchasing engine, client, multimedia delivery engine and the data mining engine.

In the current phrase, the following components will be implemented:
1. Data Input Terminal
2. Database (using Oracle)
3. Personalization Engine
4. Multimedia Delivery Engine
5. Server
6. Client

For the data mining and purchasing engine, this two components requires more time to integrate. Besides, without these two components, the overall system would not be affected.

The information provided in this phrase will be movie and the music information. The movie and music information are the popular information in Hong Kong. There are many web sites contains those information. For the TV information, it is quite complex since the TV schedule is changing every and the data provide are very large. Therefore, this kind of implement will be designed later.

Therefore the specified application of the system will be as follows. When the user login to the system, he or she can see the latest information of the film and also the music. He or She can do any personalization by filling the user preference form. In the backend, the system will trace the pattern of the use of the client and make the personalization automatically. When the user want to hear the preview of the movie or music, he or she can listen or view that immediately by the multimedia delivery engine.
Platform

Hardware

For the system, there will be three computer invovled. One is the client machine. One is the server and one is the database.

The client is a PC computer with connect to the Internet.  
The server is a SUN computer with connect to the Internet.  
The database is a SUN computer with connect to the Internet.

![Diagram showing the hardware](image)

Network

The network used in the system is the Internet, and SQLnet.  
Internet is to connect the client and the server. The reason of using Internet is the system is that internet the common, easy to connect platform. The client can easily connect to the Internet.

SQLnet is the network design by Oracle. SQLnet is responsible for the database retrieval and updating.
Software

CORBA

CORBA is the Common Object Request Broker Architecture. CORBA is used because it allows different kinds of objects to use on the system and the cooperation of the system can be easily done by the CORBA.

UNIX

UNIX is used for the development platform and the running platform of the server. The reason of choosing is UNIX is that UNIX is the most stable operating system in the market. UNIX supports multitasking. It also has high efficiency since the UNIX have very little graphics interface, thus more resource can be used for the services. Finally, UNIX are not easily down compare with Windows NT.

Web Browser

Web browsers will be the platform for adopting the client interface. The reason of using web browsers be the client program is that web browsers is the common software for most of the users. That means every user has a PC may have a web browsers in it. Besides, the web pages are easy to build the interface than building the application. Also, the users don’t need to install if the client is a web application. Finally, the web application can be run on any different Operating system, which have the web browser.
Client

Client requirement

The requirement of the client will be as minimum as possible. The Internet and world wide wide is well developed. Therefore the client will be built on top of this web platform.

The requirement of user to use the system is as follow:
- Any computer which have connected to the Internet
- Any Internet Browser such as Internet Explorer or Netscape Navigator
- The browser has the ability to operate the Java applet.

Available features

The client are providing the information to the users. Therefore, the client application should be able to show lots of the information to the user and with many features in it.

These are the available features in the client application:

i. Customizatied layout

The customized layout is done in order to suit the user look and feel. The customization of layout can be done by the user or the system. If the user want to customize its pages, it need to click a the customization button in order to re-organize its page layout.

ii. Event Calendar or Event Listing

The event calendar or listing are the ways to present the up coming entertainment event. Some users would like to have a calendar component on their personalized page such that they can quickly located when will some special event happen. Alternatively, the user can read the event is a listing.

iii. purchasing capability
The client should be able to let the user to purchase the product when they find the product they like and they want to purchase. The purchasing capability also include the shop cart, showing the price of the product, and most important let them buy and get their desire product.

**Client Functions**

Besides the above special features, there are some function need to be done in order to make the system works.

These are the function provided by the client:

i. **Registration**

The client will contain a corner for the new user to register.

This can let the new comer registered and use the system. The registration of the system should be designed as simple and user friendly as possible. The ideal situation is that the registration procedures require only two to three pages to finish.

ii. **Login**

Once the user registered, the user only need to login again when they come in the system next time. Therefore, the client should have an interface for the user to login to the system. Besides, some users may lost their password. In this case, the system should be capable to send the password to the user if they lost it.

iii. **Searching and browsing**

Although the personalization can save the page size and let the users view their desire information. However, the user may want to get the information not related to his interest sometimes. Therefore, the system should do some searching and browsing to let the user getting the information which is not in they front page. Besides, tracking the action on the search and browse service, the system can estimate the up-to-date interest of the users.
Client Available Information

Client Screen Design

Main Page

Welcome to CORBA Entertainment

Login name: 
Password: 
Login Now

Register Corner

Register Corner

CORBA Entertainment Information System

Login Name: 
Password: 
Real Name: 
Email: 
Phone: 
Location: 
Save Registration
Personalized Page

Search Page
## Browse Page

### XXX’s Personalization Entertainment Information

#### Movie Information
- **Movie Title:**
- **Movie Type:** Cinema
- **Actor:**

#### Music Browse
- **CD Title:**
- **Music Type:**
- **Singer:**
- **Song Name:**

## Profile Setting Page

### XXX’s Personalization Entertainment Information

#### User Interest

<table>
<thead>
<tr>
<th>Category</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Movie</strong></td>
<td></td>
</tr>
<tr>
<td>Romantic</td>
<td>-3</td>
</tr>
<tr>
<td>Action</td>
<td>10</td>
</tr>
<tr>
<td>Comedy</td>
<td>4</td>
</tr>
<tr>
<td>Sci-fi</td>
<td>3</td>
</tr>
<tr>
<td><strong>Music</strong></td>
<td></td>
</tr>
<tr>
<td>Pop</td>
<td>0</td>
</tr>
<tr>
<td>Country</td>
<td>-4</td>
</tr>
<tr>
<td>Classic</td>
<td>4</td>
</tr>
<tr>
<td>Rock</td>
<td>3</td>
</tr>
</tbody>
</table>
Layout Re-organizing Page

CORBA Entertainment Information System

Welcome
Logout
Personalize
Search
Browse
Profile
Layout

XXX's
Personalization Entertainment Information

Main Panel
Movie Commentary
Latest Movie List
New Release Music Album

Music News
ADD

Mini Panel
Movie BoxOffice
Music Chart
Music Shop List

Shorten Song List
ADD

Thank you for using this Service
Pages Flow

```
Login Page  ->  Personalized Page  ->  Profile Setting
new user   ↓  successful login  ↓  set profile  ↓  Layout
            ↓  successful registration  ↓  reposition the layout  ↓  Re-organize
Register Corner  ↘  Browser for some info.  ↘  Search for some info.

Browse Page  ↓  Detail Information

Search Page  ↓  Search Result

Inter-Relationship between different pages
```
Client Server Interactions

Registration

The Registration of client is described by the besides diagram. First the user registration data will be prepared on the User Interface. Then the user information will send to the server to create that new user then, the server will return status of that process.

User information:
- User id
- Password
- Email
- Location
- Job

Prepare the user information by the interface

Wait for the server response

Create user

Return the creation status

Jump to the Profile Setting page
Login

The flow of the login procedure of user is described in the beside diagram.

First the user id and the password is prepared by the client and then the login information is send to the server to check the authentication and the status is returned by the server.
Change the Profile

The procedure of the changing the profile is shown on the beside diagram.

First, the user will gather the profile information on the user interface. The information will send to the server.

Then, The server design whether the profile is exist or not. It is exist, the profile will be updated, otherwise, a new one will be created.

Then, the status will be send back.
Change the Layout

The flow of the changing of the layout is shown on the besides diagram.

The layout information is the definition of position different components.

The layout information is first prepared by the user interface. Then, the data is sent through the network to the server and the server update the layout information of that user and return the status.
Generation of the Personalized Layout

The flow of the generation of the personalized page is described on the besides diagram.

First, the user id is sent to the server in order to get the layout information, such as the set of the components to be got and its corresponding position.

Then, the data of each layout component is being got.

After the data is collected, HTML code is generated for each component.
Search Information

The flow to search the information is shown as the besides diagram.

First the search criteria, query is collected on the user interface.

Then the query will be sent to the server. When the server received the query. It will process it and generate the results.

Then, the results will be sent to the client. When the client received them, it will generate the HTML code for the data.
Browse Information

The flow of the browsing is shown on the besides diagram.

First, the client will collect the browse information, the information includes:
1. Browse level
2. What information to be shown

Then, the server will receives the information and process it. The result will then be generate and send to the client.

After the result is received by the client, the client will generate the result using HTML.
The flow to display the detail information is shown on the besides diagram.

First, the client should identify which information to be shown by its id and sent the ID to the server.

Then the server will find out the corresponding data of that piece of information.

Then the result data will be return to the client.

When the client receives the data, it generates the layout using HTML.
Logout

The flow of the logout procedure is shown on the besides diagram. First, the client will first send the logout request to the server.

The server will receive the user id and do the personalization when it re-enter the service next time.

Besides, the server will clean up the resources used by the user.
Server

Server modules is to handle all the client request and return the corresponding response to the users.

The following are the main function of the Server:
Collect the client message
Write the user personal information to the database
Write the user preference data to the database
Write the latest user action to the database
Send the user preference information to the personalization system
Received personalization’s results and send back to the client.

Connectivity

As the platform of the system is CORBA, the server need to talk to the client through the CORBA platform. In this way, the server are not required to design the protocol between the client and the server.

The following diagram will show the situations:

![Diagram](image)

How server connect to the client

From the diagram, the server contain the object implementation and then it will register to the ORB (Object Request Broker). When a client want to do a special function on the server, the client is just need to talk to the ORB and ask for the
objects from the server. Compare with the client server model using TCP. This model do not need to care about the protocol between the Client and server. The ORB has implemented several facilities for the Client and server to communicate.

Available objects

The follow objects should be provided by the Server.

1. User Session Object
   This object is used on the login of the user. The client is request this object and verify whether the user can be login to the system or not
   Methods:
   boolean canEnter – return whether the user can login to the system
   void setSessionVar(String name, String value) – set the session variable for that user
   void getSessionVar(String name) – return the value than has set before.

2. User Registration Object
   This object is used to register for the new user. The client need to pass the user name, login name, password, and other information. Besides, the user can modify it profile through this object.
   Methods:
   boolean isRegistered – return whether the registration is done or not
   void modify(field, value) – modify the value of a particular field

3. User Layout Object
   This object is used to control the layout of the user interface. The client use this object to generate the layout of the users. Besides, the object is used to modify or re-orgranize the layout the page.

   Methods:
   String genLayout – return HTML code for the corresponding layout
   void setLayout() – set the layout of the user
IDL of the Objects

User Object:

**IDL Code:**

```idl
interface UserManager{
    void create(in String id, in String pass, in String name, in String email, in String job, in String country);
    void remove();
    User get_user(String userid);
}
```

**IDL Code:**

```idl
interface User{
    attribute String id;
    attribute String password;
    attribute String name;
    attribute String email;
    attribute String job;
    attribute String country

    void login(String password);
    void logout();
    ComponentList get_layout_component();
    UserProfile get_user_profile();
}
```

**IDL Code:**

```idl
interface UserSession{
    attribute userid;
    attribute String variable;
    attribute history;

    void load();
    void clear_history();
    void clear_variable();
    void save();
}
```

**IDL Code:**

```idl
interface UserProfile{
    attribute String component_interest_matrix;
    attribute String content_interest_matrix;

    void save();
    void personalize(Session session);
```
### IDL Code:

#### InfoComponent Interface

```idl
interface InfoComponent{
    attribute String name;
    attribute String type;
    attribute String pos;
    attribute String size;
}
```

#### Movie Interface

```idl
interface Movie{
    String title;
    String actors;
    String release_date;
    String category;
    String type;

    void showInfo();
    void asHTML();
    void play();
}
```

#### MovieManager Interface

```idl
interface MovieManager{
    MovieList search(String query);
    MovieList listBy(String type);
    Movie getMovie(int movieid);
}
```

#### Song Interface

```idl
interface Song{
    String title;
    String singer;
    String lyric;

    void play();
}
```

#### Music Interface

```idl
interface Music{
    String title;
    String singer;
    String release_date;
    String category;
    String type;
```
SongList songlist;

void showInfo();
void asHTML();
}

**IDL Code:**

```java
interface MusicManager{
    MusicList search(String query);
    MusicList listBy(String type);
    Music getMusic(int musicd);
}
```
Database

There are four database require to be implement in the system.
They are:
1. User database
2. Content Database
3. Personalization Database
4. Statistic Database

User database

user database is the store the information of the register users, such as their login information, their personal information, their schedule information and their preference information.

login-scheme = (userid, password)
user-scheme = (userid, username, email, address, phone, occupation)
schedule-scheme = (userid, date, event)
content-preference-scheme = (userid, favorite category 1, favorite category 2, favorite category 3, unfavorable category 1, unfavorable category 2, unfavorable category 3)
layout-preference-scheme = (userid, component id, component position)
color-preference-scheme = (userid, background color, foreground color, components background color, data color, highlight color)

Content database

The content database are storing the events and detail information from the content source. There will be two kind of source. The first one is the movie information, the second one is the music information

movie-scheme = (movie id, name, director, studio, actor, release date, cinema, category, movie file)
ticket-scheme = (movid id, cinema, price)
cinema-scheme = (cinema id, cinema name, location)
schedule-scheme = (movie id, cinema, scheduled time)
music-scheme = (music id, name, singers, release date)
shop-scheme = (shop id, shop name, location)
record-scheme = (music id, shop id, price)
song-scheme = (music id, song name, song file)
event-scheme = (event id, event name, event description, event type)

Personalization Database

The personalization database is storing the result after doing the personalization and that are used for outputing the layout.

personalized-content-scheme = (user id, content type)
personalized-layout-scheme = (user id, component, component position)

Statistic Database

The statistic database is used to record all the user behavior for the further processing in the personalization and data mining.

user-action-scheme = (user id, user action, frequency)
user-view-scheme = (user id, event id, frequency)
user-purchasing-scheme = (user id, purchased item)
user-spending-scheme = (user id, spent money)
user-login-scheme = (user id, login frequency)
user-staying-scheme = (user id, time spend)

Data Input

In order to build the entertainment information system, there need the ways to input data into the system. There are several ways to import the data. The information can be import by replicating the data from other database. Besides, the information can be imported by the manual data input by the operator. The last way is to automatic retrieve the information from the web sites and input to the database.
Manual Data Input

To input the data into the database, there will be an interface for the operator to input to the database. The following diagram is showing the picture of how the data is input to the database.

![Diagram showing how the operator input the data]

The operator will interact with the input terminal. He can select which information event to be entered. In the system, there are movie and music information. Therefore, the input terminal should allow the operator to select the type of information to input. The operator can switch to the movie information and also the music information.

After he selects the type to be input, he needs to be guided to input the data. The inputted data will send to the database through the Internet.

Automatic Data Input

Besides, the manual data input, the information can be imported from other web sites. In the Internet, as the introduction, there is some movie database in the Internet. These web sites contain many valuable movie data or music data. So robot is used in this model to retrieve these data.

![Diagram showing automatic data input]
From the diagram, the robot will first send the HTTP request to those movie information web sites. Then it will retrieve the web pages from those sites. However, these pages are in the format for the common users to read, but not for the database.

Therefore, a parser is need for turn those HTML format into the database. To input the data into database, SQL statement should be generated.
Personalization Module

Personalization Module is used to do the personalization for the users. There will be three areas. They are:
1. User profiling
2. Layout Customization
3. Content Customization

User profiling

The signification of the user profiling is to build up a profile for the user in the backend. The user doesn’t need to build that profile itself. The process will be hidden in the backend and the effect will be shown in the front.

The effect of the user profiling can help the user save their time on using the system. For example, when the user frequently view the box office of the movie. The system will save this information and when the user come to the system next time. The box office listing will show on the top corner of the user.

The following information will be saved in the user profile:
   i. The user frequently accessing components.
   ii. The type of entertainment that they will usually access.
   iii. The queries that the user asked
   iv. The category of the user favorite movie
   v. The category of the user favorite music

Layout Customization

The layout customization is used to modify the layout of the page in order to increase the attraction of the users. Thus the loyalty of the user to the service will be increased.

There are two ways to do the layout customization. First, the system allow the user to do the customization itself. Second, the system should do the customization based on the user profile.
Here are the flow went the layout customization:

For the first case, the user customize the layout themselves. The information page will be design as follows:

The user can select which component put at which location.

If the customization is done at the back end, the system will put the user most frequently data to the higher position. For example, a user like to watch the movie box office every, the system will put that component on Location A.
Content Customization

Content customization is used to customize the information from large information database. For example, there are lots of movie information and music information available in the system. If all those information put into one big page, the page will be too large to transmit or even read. Therefore, content should be refined and re-organized to make the content slimmer and easily to read.

Ways of content customization:

The customization can be done in two ways. First, the system can trim the unwanted data from all the content. Second, the system can re-position the information. In this way the more favorite content will put into the higher position and the unwanted content will put into the lower position.

How to do the customization?

The customization can be done by ranking the content with respect to the particular user and filtering the unwanted data. First the system will retrieve the unwanted data from the database. Then the set of events will be reduced by remove those user unwanted categories. Second, the system will rank the content by setting the formula.

The formula is as follows:
The rank = level of favorite of the category * multiple factor + frequency of the user access the category.

Then sort the listing of the content event based on the rank and send to the layout generator.
Content Delivery Module

Content delivery Module is responsible to deliver the multimedia content to the user by streaming technique. In this system, each of the media type will support only one format in order to simply the system.

Content formats of each media

The following are the format of each media:
Text – HTML or txt.
Audio – Mpeg 3
Video – Quick Time

Why choosing Mpeg 3 as audio format. This is because the bandwidth requirement of Mpeg 3 is low but the quality is high.

Why choosing the QuickTime as video format. This is because the quick time is the common video format available on the market. Besides, the QuickTime video have a good quality.

Delivery method for each format

The delivery method of the multimedia content is required to do using the JMF. The reason of it is that JMF is a Java package for delivery the multimedia content.

Why JMF ?

JMF is called Java Media Framework, which support the intergration of a wide range of audio and video format into the java application and applets. Besides, the JMF can be operating on any Java platform such as Java on Windows, Java on UNIX or Java on Mactinosh. The most important is that the JMF can support for many common protocols, such as FILE, FTP, HTTP and RTP. For theRTP, it is called Real Time Protocol. That mean the JMF allow to make the system to stream the data.
Data Mining Modules

Data Mining Module is used to analyze the users who are using the system. The marketing and the sale department of the entertainment supplier may want to know more about their customer. The tradition way to know the behavior of the customers is that asking the sales or customer services officer to get the customer feedback or making survey on the market.

However, this may be time consuming for the company and the customer. By the existing data mining tools, the sale department can know more about the customer from the logged user data.

Information to be mined

So what are the information can be mined from the Data mining modules. Here are the list of information can be mined.

- The classification of the user according to region, age, product groups or spending patterns.
- recognize the pattern of the user
- The relationship between user groups and the product
- The relationship between user groups and the spending habit
- The relationship between purchasing of the products.
Implementation

Implementation Planning

The implementation of the whole system may need a long time. There are 7 major components to be built. So, it is impossible to build all the components in this phrase. Therefore, only several high priority component will be built in this phrase.

Here is the priority of the schedule of the building blocks:
1. The Database
2. The Data input module
3. Server
4. Client
5. Multimedia delivery module
6. Personalization module
7. Purchasing module
8. Data Mining module

First two building blocks, database and data input have the highest priority. Since without the data, the following blocks can’t be built. After the data is ready, the client and server will be started to build. After the data can be load from client from the server. The multimedia delivery engine will start to work out in order to let the user to get their video or audio information. Then, the personalization can be add on it to customize each user front page. After all of this building block is ready, the purchasing module is going to build in order to make the system able to sell thing online. The last one, data mining module, it is not suggested to build because there are many similar application on the market available and that need time to build this module.
System platform:

COBRA Platform

For the CORBA Platform, the system is going to adopt the Visibroker. Visibroker follows the CORBA 2.0 specification. The Visibroker allow to let the developer to use Java to implement the stub. Besides, Visibroker can support many platform, for example, it can support UNIX and Windows.

Here is some special features offered by the Visibroker:
- Smart Agent, it provide an easy way for the client to obtain the server object. It can support the load-balancing and fault-tolerance
- Smart Binding, this technology make the remote object bind as easy as possible, for example, if the client and the object implementation at the same machine. It will make communicating using java method instead of passing throught the ORB and IIOP.
- URL Naming Service, the object reference can be obtain via URL address.
- GateKeeper, the is a light weight HTTP daemon written in Java which can help in test the applets using CORBA.
Database

The following tool will be used to maintain the database record

- SQLPlus
  SQLPlus is a client program to connect to the database server. The tool can help to create the table, view the data record and make stored procedure for the project.
- JDBC
  JDBC is the driver for Java program to connect to the database server. Since most of the program in this project is written in Java. It is important to install JDBC to connect to the database.
- Perl DBI, DBD::Oracle
  Perl DBI is the programming interface for perl program to connect to the database server. DBD::Oracle is the driver for the perl to connect to the Oracle. Since the data input terminal and data input robot will be implement by perl as it is easy to use and it doesn’t require to use on the CORBA. So, Perl DBI is installed.

For this project, Oracle will be used as the database management system.
Data Input Terminal

Robot Input

In the specification, the system is required to build an automatic data input program for the import of the entertainment information from the Web. The best choice is to use Perl to implement.

Why Perl? In Perl 5.0, it contains many modules. One of the modules is called libwww-perl which can allow the program to connect to the web sites and retrieve the pages. Besides, Perl supports regular expression which can make it easy to implement the parser program.

Manual Input terminal

For the manual input terminal, web will be used as the interface. The implement will use JSP to as the client and connect to the server for the update and insert of the data. The reason of this is to taking this opportunity to learn JSP, CORBA and JDBC.
**Server:**

The server will be implemented by java with the Visibroker. The follow objects will be implemented in this Server Modules.

<table>
<thead>
<tr>
<th>Object Name</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data</td>
<td>Id</td>
</tr>
<tr>
<td></td>
<td>Password</td>
</tr>
<tr>
<td></td>
<td>Username</td>
</tr>
<tr>
<td>Method</td>
<td>Add</td>
</tr>
<tr>
<td></td>
<td>Delete</td>
</tr>
<tr>
<td></td>
<td>Login</td>
</tr>
<tr>
<td></td>
<td>Logout</td>
</tr>
<tr>
<td></td>
<td>Change Password</td>
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<tr>
<td></td>
<td>Send Password</td>
</tr>
<tr>
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<td>NoSuchUser</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Object Name</th>
<th>UserInfo</th>
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</thead>
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<td></td>
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<table>
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<th>Content</th>
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<td></td>
<td>Category</td>
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<tr>
<td>Method</td>
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<tr>
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<tr>
<td>-----------------</td>
<td>----------------------</td>
</tr>
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<td>Rating</td>
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<td>Commentary</td>
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<td>Preview</td>
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<tr>
<td>Method</td>
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<td></td>
<td>Get Price list</td>
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</table>

<table>
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</tr>
</thead>
<tbody>
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<td>Songs</td>
</tr>
<tr>
<td></td>
<td>Price</td>
</tr>
<tr>
<td></td>
<td>Commentary</td>
</tr>
<tr>
<td>Method</td>
<td>Get Songs list</td>
</tr>
</tbody>
</table>
Client:

**Building Tools**

The client is the application communicate with the users. The client will be built by the following tools.

**JSP**

JSP is the Java Server Pages. It is something similar to the ASP (Active Server Page) which is the embedded coded HTML. The role of JSP on the client program is too display all the information to the users. It is also responsible every front end interface of the users.

**Javascript**

Javascript is the script which will run on the client sides. The role of javascript in the client interface is that is with use the generated some client-dependent information such at the time of the client, and doing the client-sides checking. For example, the javascript can check whether the user input valid information in the registration form.

**Paint Shop Pro**

Paint Shop Pro is one of the graphics tools available in the market. As paint shop pro is a freeware and easy to use. It will choose to use for the graphics design for the client interface.
How the client works?

The follow diagram will show how the client works.

From the above diagram, the client will use the Web browser to view our pages. The pages are the Java Server Page (JSP), which loading into the Java Web Server. The java web server will process the JSP and deliver to the Client. When the java web server is processing the Java Server Page, it will run the code embedded in side the Java Server Page and at the time, the remote object in the CORBA Object Request Broker will be got to build up the pages.
Appendix: Development Environment

Operation System

For the Server sides, the operating System is UNIX
For the Client sides, the operating System is Windows

Tools Set

Java

Java is the core language in the development in this project.
JDK 1.2 will be used.

JMF

JMF is an addition package of JAVA.
JMF is used for the part for doing the multimedia streaming.

JSP

JSP is an addition tool of JAVA to build the web sites.
JSP is for creating the web interface for the client sides.

JDBC

JDBC is an addition package of JAVA for connecting the program to the database.

CORBA

CORBA is called Common Object Request Broker Architecture. It is used as the platform for the communication between different objects.
Perl

Perl is a scripting language. In this project, it is used to build the data input program.

Libwww-perl module

Libwww-perl module is the add-on module for perl. With this module, perl can retrieve the Web pages using HTTP.

Perl DBI Module

Perl DBI Module is the add-on module for perl. With this module, perl can connect to the database.

Editor

Vi will be used in development of programs in UNIX environment. UltraEdit will be used in the development of programs in Windows environment.

Graphics Design

Paint Shop Pro will be used for design the graphics that need in the client interface.

Documentation

Microsoft word is used to do the documentation.