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Development of Multimedia Web-based Transit Databases

**Development of a Multimedia  
Web-based Transit Database**

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## **Introduction**

The University of Washington has a very large collection of slides, videos, and information related to transit, taken around the world, over different time periods, and illustrating various aspects of public transportation. Unfortunately, this collection is physical and only available locally. Given the interest in, and importance of, visual information for understanding, explaining, and comparing transit alternatives, there is a need to make this information more widely available and more easily accessible.

In addition, transit collections are available elsewhere documenting various local practices. There are currently no convenient mechanisms for sharing these collections. On-line databases provide the tools for allowing individuals and organizations to make their collections available to others. A web-enabled image database that allows information upload, as well as search and download, could become a central repository for visual transit information.

## **Problem Statement**

The goal of this project is to develop, test, and deploy a Transportation Media Library--- a web-enabled multimedia database to allow broad access to images, video, and other information related to transit facilities and technology. We believe that such an on-line library will be of benefit to a broad range of users (students, transit planners, etc.) and will allow the documentation of various transit-related practices from around the country and the world. To fully develop the potential of the database, it should be readily searchable / browseable in a variety of ways, extensible by remote users, and clearly identify copyright and ownership associated with the elements of the library.

## **Objectives**

The specific objectives of the on-line library include:

- It should contain information about transit vehicles, facilities, and technology from around the world: it includes buses, PRT systems, light and heavy rail, commuter rail, park-and-ride lots, paratransit and passenger ferries. The database allows people to view these components individually or as total systems. For example if someone is interested in Bus Rapid Transit there would be examples of low floor vehicles, busways, shelters, real time schedule systems, AVL, signal preemption, Q jumps and off-vehicle fare collection. These items could be viewed as one total system application, such as the Vancouver 98B line, or many different examples of a specific system component, such as different types of busways.
- It is searchable via a flexible search engine front end to allow users to type keywords, Boolean queries, and customize the collections (image modules) to search in.
- It should stream video out to users through standard software.
- It should allow remote users to add their own images to the database. In order to make the proposed database a general repository for the community, users (with appropriate authentication) can add their own images to the database. When the images added, textual

descriptions of the images, information about their dates, locations, copyright status, etc. may be optionally specified. This will make the added images query-able and available for others to view.

- Mapping facilities should be developed to provide support for adding precise location information (specific addresses, GPS coordinates, etc.) to tag the entries of the library.
- It has user management capabilities to authenticate users, provide different levels of access privileges, allow various users and administrators to manage collections, etc.

## **Approach**

The tasks involved in creating the multimedia database include: creating the basic framework to archive and store the media, creating a search mechanism for retrieving records, and an establishing method to deliver the multimedia back to the end user, all over the internet. The basic framework of the multimedia database included a commercial SQL database, a web server, and middle-tier components to communicate between the end user and the database.

The user interface and middle-tier components were created using Active Server Pages which allow for dynamic generation of HTML based on database values. The user interface is displayed as a web page viewable through a web browser. The user performs all functions including new data entry, record searching, and data retrieval through the web interface. Security features require the user to login to the system before performing any actions on the database. Only a subset of users is authorized to upload media into the database while all public users can only view the media that is not copyright protected.

In order to create an effective search mechanism each of the multimedia items that are entered into the database are catalogued using a series of keywords and descriptive terms. Each of these terms along with the meta-data associated with the multimedia item are archived in the database and indexed such that each media item can be referenced using any combination of words that were used in the cataloguing step. The results of the search are displayed using thumbnail images of each of queried records. The images and media are directly available for download over the internet through a web browser. A “slide tray” is the metaphor used to collect, download and/or view the set of desired images.

In order to deliver video clips to system users a media terminal was created on the web hosting platform. The media terminal takes video clips and streams them over the internet. By streaming the video instead of requiring users to download the entire clip the web server can efficiently handle multiple requests for video without reducing the bandwidth capabilities of the site.

Sources for images and video clips came from a variety of sources. Several transit professionals as well as Professor Scott Rutherford’s personal collection of slides and digital images contributed to the initial database. Video clips were digitized and saved as in QuickTime format. After the first set of images and clips were entered into the database, other materials were collected through a general search over the internet. Sites of interest included transportation agencies, authorities, and departments, project pages, and government web sites. Before image

and clips were taken from these sites and entered into the database, permission was sought for its use.

## Results

The main result of this work has been the development of a Transportation media library. The library is now available at <http://asphalt.ce.washington.edu/medialibrary> and can be accessed through a standard web browser. In this section we briefly overview the core functionality of the library.

A snapshot of the opening page of the library is shown in Figure 1. From this page, basic searches can be performed using general Boolean expressions. On line help for using the library (including search strategies, collections, slide trays, user account information) can be reached through a hyperlink on the top right.

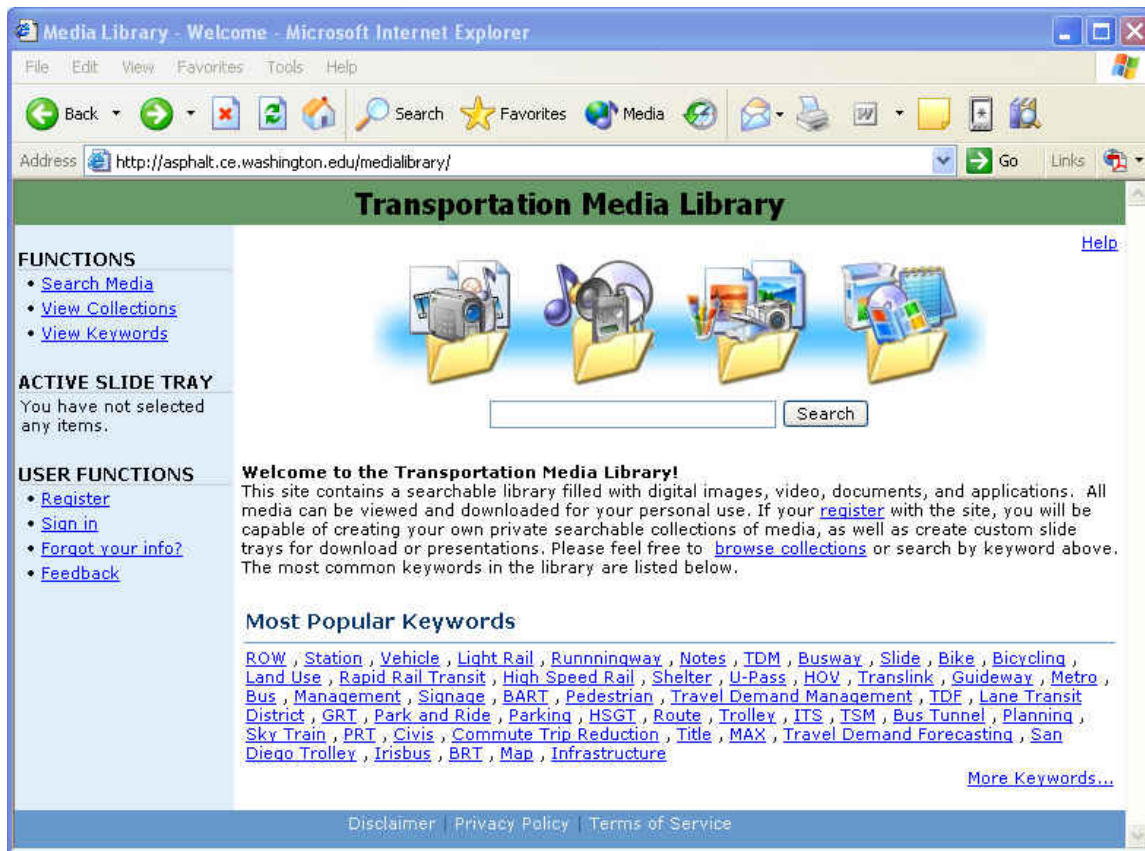


Figure 1 Transportation Media Library Opening Page

Search Results are displayed in a window such as the one shown in Fig 2. Thumbnails of the images matching the query in the desired collection(s) are displayed. The thumbnails are hyperlinks and can be clicked to obtain full details on images. Selected images can be saved to a “slide tray” that can be downloaded or used to view them through the browser.

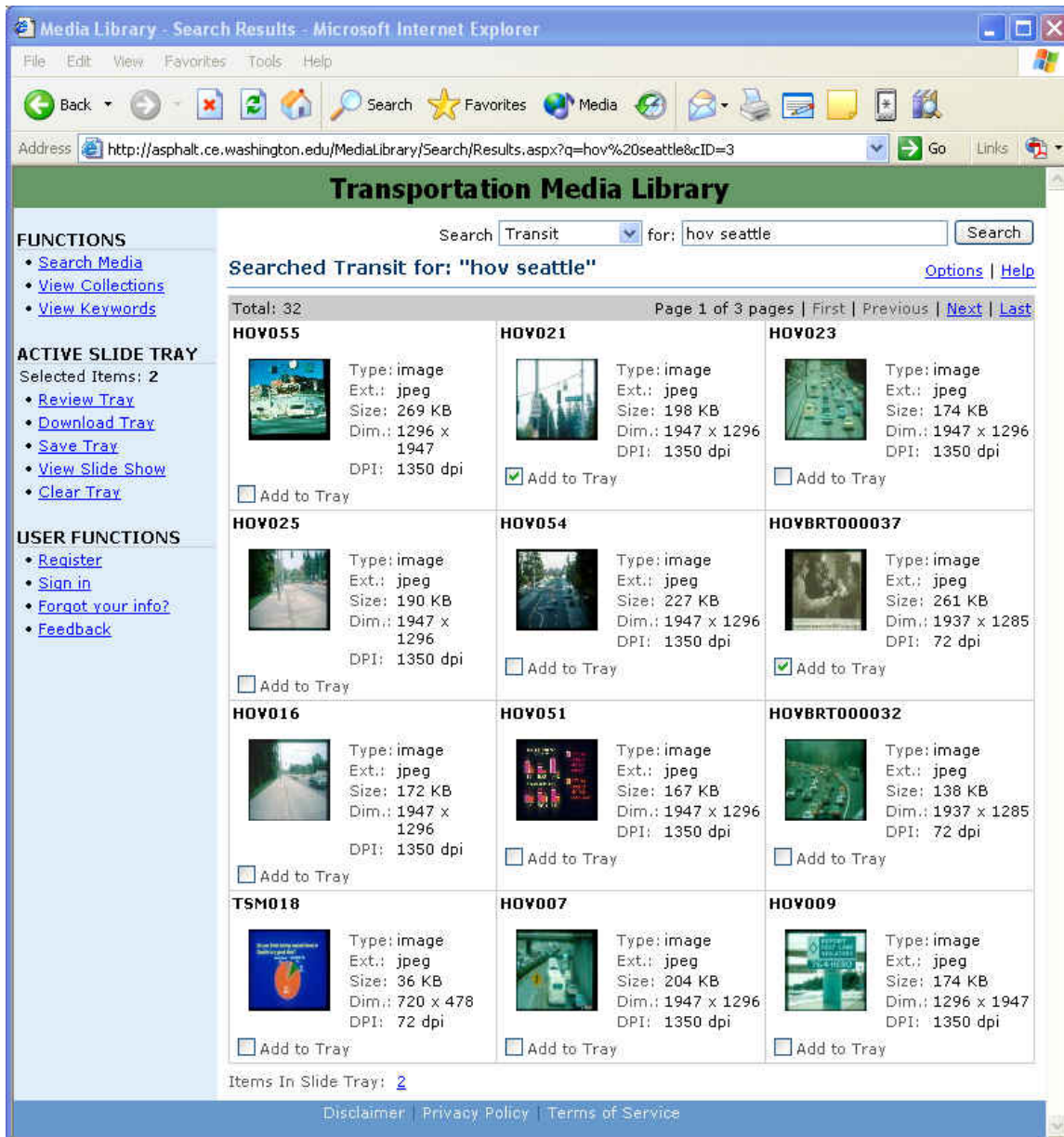


Figure 2 Search Results displayed as thumbnails

Uploading images and other media to the library can be performed through the "Upload Media" link of the opening page. Each file is uploaded into the database along with several data fields: file, title, file type, keywords, source, comments, and copyright status,

A mapping engine was also developed for supporting browsing and searching the library. The map engine provides the capability to dynamically generate a spatial interface. A set of base maps display data based on the zoom level to which the user has specified. Users can view data that ranges from the country level down to the surface street level. They can specify selection regions over which searches are to be performed. They can also overlay any spatially referenced data over the base maps to generate spatial displays.

However, in order for images to be usable by the map engine and provide search capabilities, a spatial reference must be included. In examining the images of the current media library, the only spatial reference that could be provided was a keyword or city name that describes where the image was taken. This does not provide the map engine with enough information to display the images in an effective manner. As a result, the mapping engine was not incorporated in this version of the library. However, as GPS coordinates or specific locations are used to tag images, the use of the spatial map interface will become more useful.

## **Conclusions**

The Transportation media library provides convenient access to an extensive database of transit related images and video clips. This first version of the library has browsing and general free form search capabilities. It allows users to organize selected results of their searches in “trays” for later viewing or download. It allows users to upload media files to authorized collections and add keywords so the files can be queried. On-line help and user-account management facilities are also available to streamline the user interface. The system is available at <http://asphalt.ce.washington.edu/medialibrary>.