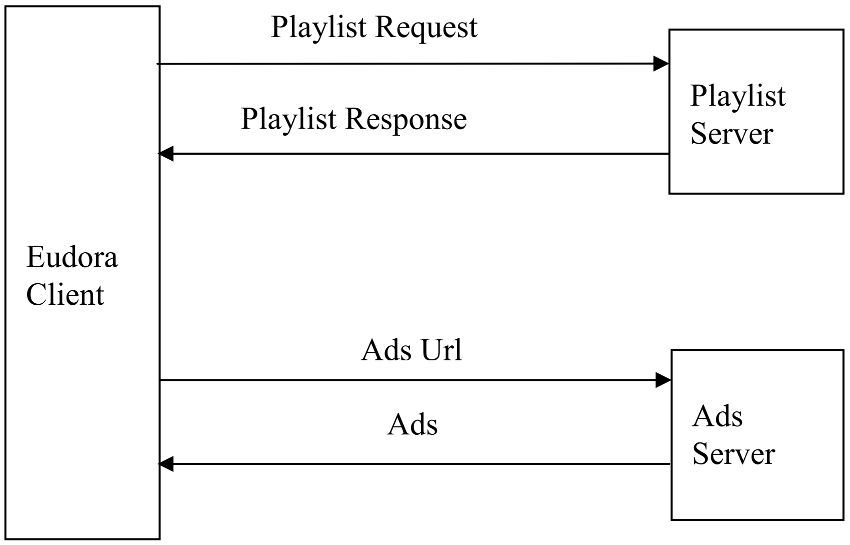
Playlists

The Playlist is a way to control the fetching and display of ads in Eudora. Its primary benefits are the separation of ad parameters from ad images, insulation of the Eudora client from intimate knowledge of ad image servers, and centralized server intelligence in ad distribution, without requiring user registration or centralized user databases. PlayLists vary from specifying the exact set of ads Eudora runs to simply transmitting abstract URI's that will choose their own ads. PlayLists are a powerful tool in controlling ad display in Eudora

The following diagram illustrates the the Playlist system;

- the client connects to a Playlist server
- the Playlist server returns a playlist to the client
- the client then connects to the Ad server with the ad urls specified in the playlist
- the Ad server then returns the requested ads to the client



Playlist Requests

The playlist request, which is sent by Eudora to the Playlist server in order to initiate the ad fetch process is a block of XML that gives the server the information it needs to build or select the proper playlist for the user. The information in the playlist request is as follows:

userAgent	This is a string identifying the application requesting the playlist, its version number, and the platform.

Playlist	This identifies the playlist the client is currently using. This may have multiple values if the client is working off more than one playlist.
entry	A list of the id's of the ads recently shown by this client. The entries are nested inside the playlist to which they belong. Each entry can have zero or more of the following attributes: **active**="0" meaning the ad is no longer being shown. **isRunout**="1" meaning the ad is a runout ad. This saves the server having to do a lookup on the ad. **isSponsor**="1" meaning the ad is a sponsorship ad, to be shown in place of the QUALCOMM. **isButton**="1" meaning the ad is a a toolbar button. **deleted**="1" meaning the ad has been hidden by the user. This is allowed only for toolbar ads.
faceTime	This lists the amount of face time the user has used in the last seven calendar days. This allows the server to determine how many ads the client is likely to be able to display. The value for the current day is the greater of today's value and last week's value for today.
faceTimeLeft	This is a total of the amount of face time requested by the ads still left in the client's ad cache.
faceTimeUsedToday	This is the amount of facetime the client has used toward displaying ads today. It can be used by the server to determine whether a date-critical ad can be shown today.
distributorID	This id is used for the bounty system, so that the Playlist Server can identify and credit the ISP or other organization that gave away this copy of Eudora.
pastry	This is a cookie the Playlist Server gave to Eudora in the past. It could contain any state the server wishes to save.
Profile	Profiling information entered from our web page.
screen.height	The height of the display on which the ads are shown, in pixels.
screen.width	The width of the display on which the ads are shown, in pixels.
screen.depth	The depth of the display on which the ads are shown, in pixels.

playListVersion	The version # of the playlist spec implemented by this client.

Not all of these parameters are likely to be actively used at the same time; some are present to support particular modes of operation, and will not be used in other modes. Every playlist request is checksummed with MD5. Before computing the checksum, a secret seed is prepended to the request. The MD5 digest is encoded in hex and put in a "CheckSum: " header in the request. The server may ignore requests that fail the checksum.

Playlist Response

After the client makes a Playlist Request, the server replies with a Playlist Response. The Playlist Response is divided into two major sections; the ClientInfo section, which updates general client behaviors, and the Playlist itself, which describes the ads the client should fetch. The Playlist Server may also return an empty response, meaning that the client should continue on its course with the ads it has. Every playlist response is checksummed with MD5. Before computing the checksum, a secret seed is prepended to the playlist. The MD5 digest is encoded in hex and put in a "CheckSum: " header in the response. Clients should ignore playlists that fail the checksum.

Playlist Response - Reset

We have seen some clients become befuddled, due to old client bugs, server bugs, etc. Sometimes, the bad data inherited by even an updated client is too weird for the system to function properly. While we could make the client detect this, it seems better to leave the job to the server, which can be changed more easily. So, if the server detects that a client has wandered into the weeds and must be brought back into goodness, it responds with just a single command: **reset**. No ClientInfo should follow, no playlist should follow, just the reset command.

On receiving the reset command, the client should throw away all its ad databases and records, including playlists, facetime history, ad history, ad caches, etc. Everything should go back to what it would have been before the ad system was run for the first time. Link History is exempted from the reset command, both for reasons of practicality and because it is so user-visible. The only other item of ad data that reset does not affect is the ad failure counter, which should be retained across a reset. The client should then notice that it has no playlist, and make another request for one.

Playlist Response- ClientInfo Section

The clientInfo section is a powerful feature of playlists. It allows us to control the application in a global way, including moving smoothly from one ad model to another. The clientInfo section updates various client parameters. The parameters are:

reqInterval	This is the number of hours the client should wait before checking for a new playlist. If ad turnover is high, this will be a small number. A sponsored freeware version might have a much higher number here, so that it checked for a new playlist only once a week or once a month. Clients may also check for new playlists if they have ads with nonzero showForMax values, and the ads have used up much of their time.
histInterval	This value is the number of days the client must remember that it showed a particular ad. It will report this to the server so that the server can, at its discretion, choose not to show ads for competing services to that particular client.
pastry	The abovementioned cookie. The server can store whatever state information it wishes in this cookie.
flush	More command than parameter, if present it causes the client to discard an old playlist or ad. Flushed ads and playlists are removed completely, and no longer show up in ad histories.
width	The width in pixels the client should make the ad window be.
height	The height in pixels of same.
facetimeQuota	The number of seconds of facetime the client should devote to regular ads, before moving to the runout ad.
rerunInterval	The number of days an ad may be "rerun"; that is, shown for free after all other ads and the runout are exhausted. The time is measured from the last non-rerun showing of the ad.

Playlist Response- Playlist Section

The playlist itself has one global value

playlistID	This id is the one the client will tell the server it has the next time it connects. The remainder of the playlist is a list of ads.

Each ad is allowed to have many parameters, though not all of them will be used with a single ad, and it is possible that some of them will never be used at all.

Scheduling parameters:

showFor	This is the number of seconds the ad should be shown for at any given time. This number might be small, like a TV ad (eg, 30), or large, more like a billboard (eg, 3600 for an hour all at once).
showForMax	Maximum total amount of time to show this ad. The ad is exhausted after this time, and should be discarded once new ads arrive.
dayMax	Maximum number of times per day to show this particular ad.
blackBefore	The amount of time the ad window should be blank before the ad is displayed.
blackAfter	The amount of time the ad window should be blank after the ad is displayed. BlackAfter runs concurrently with the blackBefore of the next ad, so that the actual time between ads is max(blackAfter,blackBefore), not blackAfter+blackBefore.
startDT	Date/time (timezone optional) before which the ad should not run.
endDT	Date/time (timezone optional) after which the ad should not run.

Ad Information:

adID	A unique identifier for the ad in question. A 64-bit integer, the top 32 bits of which are a server authority id, the bottom 32 bits an identifier unique to the server authority.
title	A human-friendly string used to refer to the ad.
src	A URI indicating where to get the actual ad to show. This might be highly specific (eg, http://media48.doubleclick.net/eudora/coke/drinkcoke.gif) or it might be much more general (eg, http://ads.doubleclick.net/eudora/ad.htm?1). There can be a **checksum** attribute on the src tag. If present, its value is a hex-encoded MD5 digest of a secret seed and the ad data. The client may check this checksum against

	the ad data.
isButton	Is this “ad” a toolbar button? If so, it will be scheduled separately from the main ads. The only scheduling parameters that are meaningful for toolbar buttons are startDT and endDT.
isSponsor	Is this “ad” a sponsor placard? If so, it will be scheduled separately from the main ads.
isRunout	Is this ad intended to be run after all other ads have exhausted their runs for a given day? There will only be one active isRunout ad in any client’s collection of playlists.
url	The place to take the user if he clicks on the ad.

Playlists and Models

It has been mentioned in passing that not all parameters are likely to be used at one time. In fact, playlists are flexible enough to support many ad models. Playlists are crucial to some ad models, to others they are helpful but not central, to still others they are marginally useful, but do not present significant impediments. The use of playlists does not predispose us toward a specific ad model; they can be used to support any model we choose. Indeed, they can even allow us to switch ad models midstream, should we decide to do so. In the discussion that follows, we will outline several ad models, and show how playlists would be used for each model. In doing so, we will demonstrate the essential neutrality of the playlist concept to the ad model.

Ad Models – Persistant Ads
This is our current working model. In this model, the playlist provides the most functionality.

PlayList Request

faceTime	Used to determine how much advertising to send to client
faceTimeLeft	Not used

PlayList Response ClientInfo

reqInterval	Relatively large; one or more days
flush	Used. Single playlist completely specifies list of ads client should have

PlayList Response Scheduling Parameters

showForMax	Not used

One thing to notice here is how few of the parameters from any of the sections appear in the chart.
That's because they are largely not relevant to the choice of model. The parameters will either be used or not, no matter what the model. For example, we can have blank space after an ad in any model, and we can eschew blank space after an ad in any model. Most of the parameters fall into this it-just-doesn't-matter category.

Ad Models – Short Lived Ads
In this model, we accept many ads; either from many advertisers or only a few advertisers.
Ads do not persist for many days; they're used up and discarded at a relatively rapid rate.
Here is how this model is supported by playlists:

PlayList Request
faceTime Not used
faceTimeLeft Used to determine how many ads client should receive

PlayList Response ClientInfo

reqInterval	Not used. Instead, client requests new playlist whenever ads "run low".
flush	Not used

PlayList Response Scheduling Parameters
showForMax Used to determine how long an ad runs

In this model, playlists will be used additively. Each time the client runs low on ads, it will ask for another playlist which will describe a few more ads to mix with the clients' existing
ads. When ads use up their time, they're history. In this model, the playlist server really only
serves to transmit parameters for ads. But that's ok; the parameters have to be transmitted somehow, after all.

Ad Models – Mixed Models

Suppose we want to mix ad models; some long-running ads and some short-lived ads. How we handle this situation depends on the stoichiometry. If we have mostly persistent ads and only a few short-lived ones, we merely crank up the reqInterval and use playlists as in the Persistent Ad Model. If we do this, we merely pick a few random ads to go on each playlist, and pick a few more random ads to go on the next playlist, which the client will fetch the next day. If, on the other hand, we have only a few persistent ads and mostly short-lived ads, we will use multiple playlists. One playlist will list the persistent ads, as above, and we'll fill the remaining facetime using playlists of short-lived ads.

Play List Servlet

The Playlist Servlet is a server side program that services HTTP requests and return HTTP responses. Each request lunches a different thread.

The following section explains the task flow when the servlet doPost method is invoked.

Parse request
The playlist servlet parses the XML request and builds objects that represents the client Update request. The XML parsing is done using the SAX API.

Logging the client request
The playlist servlet stores the client request information in ClientUpdate table.
When issuing the same SQL statement repeatedly, it is more efficient to use the Prepared Statement rather then a Statement to execute a query.
In the logging we will use the following semantic:

```
PreparedStatement ps = conn.prepareStatement("INSERT INTO
ClientUpdate (date, userAgent, playListId,…) values (?, ?, ?, ?,..)");
```

Generating new Play List
For generating play list the servlet is using both SQL queries and programming filtering. This process is synchronous in order to prevent conflicts when accessing the database. Following is a pseudo code:

- The list of available ads is build from the following query:

```
ads = dbCon.prepareStatement("SELECT * FROM ads WHERE
StartDate <= today AND endDate >= today + 30 AND
AdType = “I” AND AdStatus = “A" AND ImpressionsServed < Impressions
ORDERD BY ImpressionsServed ASC);
```

run out ads = dbCon.prepareStatement("SELECT * FROM ads
WHERE StartDate <= today AND endDate >= today + 30 AND
AdType = “R” AND AdStatus = “A" AND
ImpressionsServed < Impressions ORDERD BY ImpressionsServed ASC);

Ads list holds all the image ads that are active and can be delivered within the time frame

- calculate the number of seconds needed to be delivered back

face time left for today [seconds] = faceTime[today] – faceTimeUsedToday
face time left for today is the number of seconds we can use to deliver special ads today.

predict face time [seconds] = SUM(faceTime[tomorrow] , faceTime[tomorrow + 1] , … faceTime[tomorrow + reqInterval]) predict face time is the number of seconds we predict the user is going to have

goal show time left [seconds] = predict face time – faceTimeLeft
goal show time left is the number of sequined we need to fill with ads.

- Targeting

```
*while (face time left for today ) {*
    *if ad is not in the history {*
        *select ad [according to target = today]*
        *face time left for today -= ad.showFor*
    *}*
    *next ad*
*}*
```

```
while (Goal show time left ) {
    if ad is not in the history {
        select ad [according to target]
        goal show time left -= ad.showFor
    }
    next ad
}
```

- If we have more time fill it with run out ads
  Find run out ad that is not in the ads history that fits into the Goal show time left.

Default values:

reqInterval = 1 day.
facetime = 30 minutes
faceTimeQuota is ?
histLength = 31 days

Play List Response

When generating XML, it often is useful to generate comments, processing instructions, and so on.
XP Writer provides a set of methods for creating specific kinds of nodes in the output.
Following are the method the playlist servlet uses to generate the output:

- Starts an element – starts – tag
- Ends an element - end-tag or close the currents start-tag as an empty element.
- Attribute – add attributes to a tag name value pair format
- Comments – writes a comment.

Logging the response

The playlist servlet stores the response information in two tables:

- play list general response table – holds the client info section and the play list general information
- play list specific response – holds the entry section

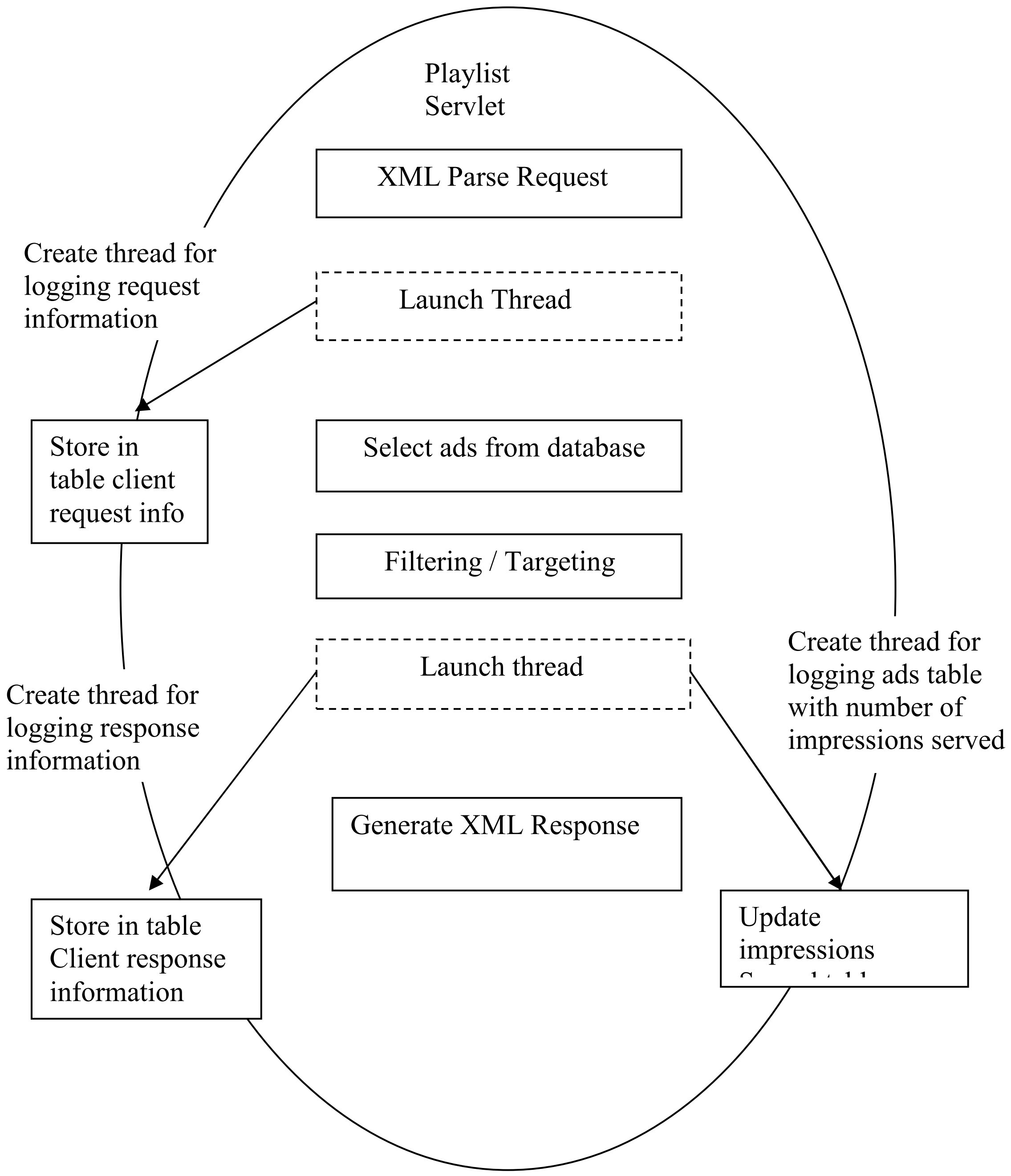
Play List Servlet Classes

The following class diagram describes the play list servlet.

- PlayListRequest class handles the request and map the XML request to the clientUpdate object
- PlayListResponse class handles the response and writes the clientUpdateResponse back to the client
- PlayListsGenerate class generates the play lists.
- DBManager class handles the Data Base connection pool
- PlayListServlet class is the servlet interface.

Servlet Threads

All the database storing actions can be threaded. The following diagram illustrates these tasks


Playlist Servlet
XML Parse Request
Launch Thread
Create thread for logging request information
Store in table client request info
Select ads from database
Filtering / Targeting
Launch thread
Create thread for logging response information
Create thread for logging ads table with number of impressions served
Generate XML Response
Store in table Client response information
Update impressions