Implementation of Music Playing WEB Site with Asychronous Visit Mode Based on Set-top Box

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Abstract. Network music is an important form that people listen to music now, in PC desktop system, browser with HTML5 and the multimedia plugin can imply very good online selection ways and listen to the program with beautify pages, but in the set-top box system, it is extremely different. In this paper, we use a network set-top box with embedded browser system to realize an asynchronous access mode of music website design, the system uses the JSE to achieve music file playback controls, at the same time, the online transcoding system, on the server side for transcoding to improve on the different types of music file playback compatibility, and with an asynchronous access pattern method, time-consuming part is transferred into the background, and the browser Ajax method for interactive prompting. The experimental results show that the system has better interactive performance with respect to the normal music website which is usually synchronized visit ways, and improve the user's listening and viewing experience.

1 Introduction

Network music is an important way for individual users to listen to music programs. With the web site of this interactive media carrier, individual users and music producers can narrow the distance between each other[1]. The interactive web page can easily let many people choose their own favorite song, a variety of types of songs and save their interesting programs with many appreciation ways. It is the dream of many families that they can lay listening to songs in the home[2].

In the music website clients, digital set-top box is an important terminal. Thanks to the set-top box, many varieties of television can make use of intelligent set-top box to achieve the purpose of interaction and realize the function while watching and appreciating. The effect of set-top box to access music resources through music sites will be limited by the set-top boxes function and web sites. [3][4]

2 Music Play Page Design Ideas

2.1 Overall Design Architecture. To achieve the music player sites, the music files that need to be played has been handled in the initial media resource management. The mode of supply of the network resources is based on the way of NFS network file. For songs, as well as corresponding to the singer and the corresponding picture resources are provided through the MySQL database access. The set-top box is based on the embedded browser with network set-top boxe types, and the function of playing with music files need the package of TS flow in set-top box.
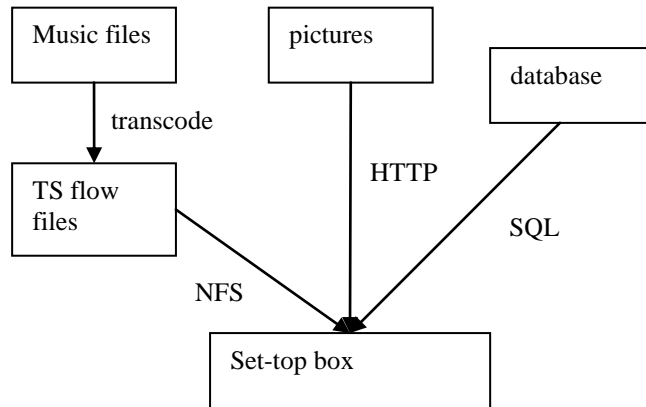
Figure 1 Data flow figure

The music files is saved in distributed storage devices, and provided with file access service via NFS. Due to file format for a set-top box system compatibility issues, the music files should be done with online transcoding to generate the TS stream file for set-top before the play will start. If we have the TS stream file, this step will be skipped. Pictures show the identity of the singer, here they also are good for the user to find the favorite singers and select their songs. The pictures use the HTTP protocol to access. The overall data are recorded in a large MySQL database accessed with SQL language. The whole system background is a WEB APACHE server using PHP language page to design and imply the functions.

3 System Implementation Method
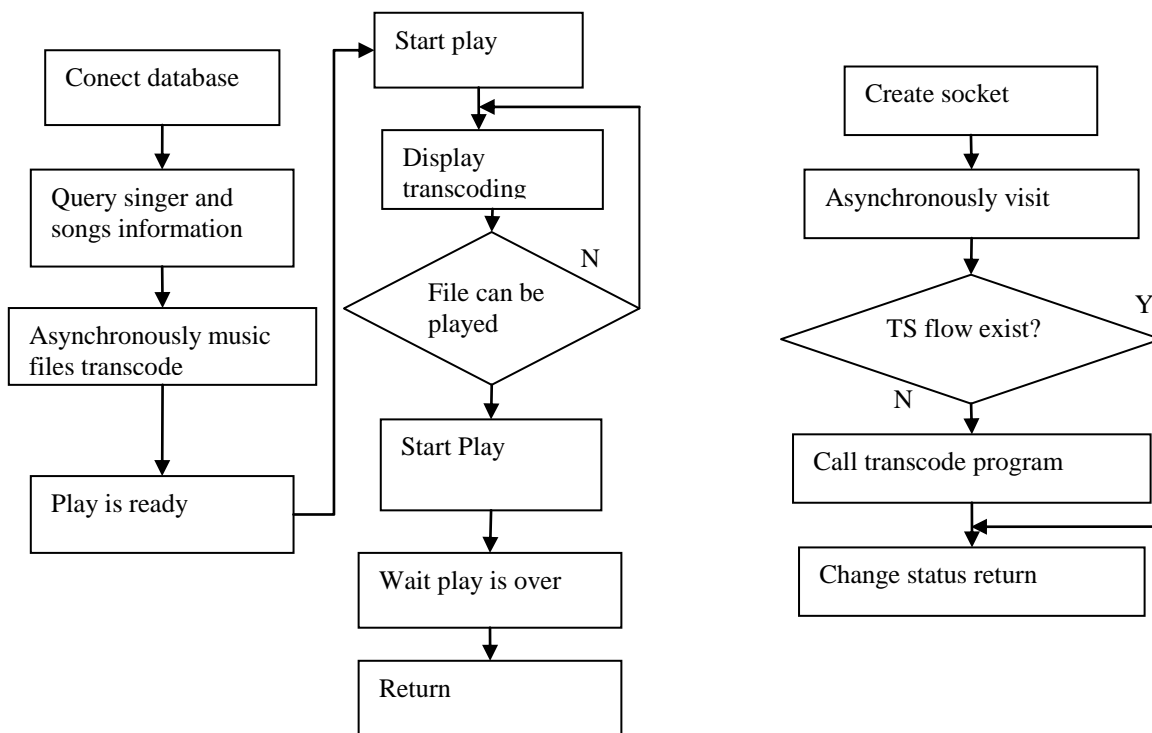
3.1 Play Function.

Figure 2 File play flow and Asynchronous transcoding flow

System deployment using web Apache server as the front page of the server, dynamic page programming language using PHP language. Connect to the database using select ID through the SQL field to query to the singer and song information. Page display to be combined with embedded

168

browser support HTML syntax. The embedded browser used here is the ANT company's commercial Galio embedded browser, the standard basically compatible with most of the XHTML standard.

Due to the function of online transcoding, the function on the server side, may will introduce a long processing time, here the use of the web server of the multi task processing method to deal with this part of the asynchronous, direct access to the playback start interface.

The following is the use of a XML to label the processing state

Table I   File transcoding status

Present series	Process status	User ID
1	0-100，-1 is error	

Using Ajax call a callback function to monitor data processing state, and then use a picture with SRC links to update the relevant results, three types of dynamic prompts the user now to deal with the situation, so that achieve the interactive prompt.

Then, when judging it can do normal playback now since the file conversion is over, system calls the JSE corresponding playback function to start normal play, at the same time to enter the playback end event wait and the end of the play button is pressed in the wait state for playing end to achieve playback control functions[5].

3.2 Media File Conversion. The audio format and data types of the music file are various, and the file is difficult to play with the set-top box. So the music media file should be transcoded. The whole system is running in the apache+php environment, the file on the server side of the online transcoding.

Here using the system PHP function to call the FFMPEG tool for real-time transcoding. Transcoding results are written to the XML processing status file like the table 1, then wait for subsequent processing.

3.3 Asynchronous Page Access Switch. Here you use the fsocketopen function in PHP to create a handle, and then to build a http header and then use the fwrite function of PHP to asynchronously trigger page access, the flow of online transcoding page is above.

In this page, we need connect the database to query the corresponding file information, and then judge if the ts stream file of music song file exists, and initialize the XML related state value, transcoding preparation, transcoding using the method above, finally judge if the transcoded file is normal generation and change the state of the return value.

4 Conclusion of the Experiment

Here in accordance with the following to deploy the system, WEB server using a 380MT WINXP DELL system, dual core 2.93GHZ, memory 3G, the use of APACHE+PHP+MYSQL structure. At the same time, a NFS server is deployed on the machine. Set top box using BCM7401 Broadcom as the core of the IPTV network set-top box, embedded browser using Galio Ant browser, the internal 100M LAN environment

The following table shows the response time of the query and the page switching function, and the switch page contains pictures and text information about 5 singers. The part of the singer's repertoire is a list of the names of the songs.

Table II Time test result of page switch to query operation

Time of page switch response	Main page switch to query singer types（s）	Main page switch to query singer names （s）	Main page switch to query song lists（s）
1	1.585	1.966	1.729
2	1.664	1.965	1.957
3	1.809	1.640	1.708
4	1.517	1.732	1.628
5	1.440	1.687	1.751
average	1.603	1.798	1.755

Under the better network conditions of 100M, the switching time between 1.6 to 1.8, which is limited by the time of the switch of the set-top box browser and the query speed of the database. Time is slightly longer, but limited by the lower frequency of the set-top box 7401 series of frequency which is only 350MHz, the response can be accepted.

The following is from the pressed with play button to start the song to play the page switching time and start to play, because the music file to be online transcoding, so it has a longer time.

Table Ⅲ Time test result of page switch and to start play

Time of page switch response	Nomal synchronous page switch method(s)		asynchronous page switch method(s) (s)	
items	Page switch	Play start	Page switch	Play start
1	5.653	9.322	5.567	8.103
2	6.956	10.583	3.432	8.408
3	7.637	9.486	1.564	5.752
4	6.567	8.105	3.078	6.531
5	19.356	21.772	4.932	18.135
6	19.876	21.741	3.972	18.573
average	11.008	13.502	3.758	10.917

From this table, it can be seen that with respect to the page switching without play, with asynchronous online transcoding function page relative to the query page above is nearly 2 seconds delay. This is mainly due to that server-side asynchronous start online transcoding, and browser in addition to parse and render the page would also like to start the corresponding playback, all of these can occupy some time.

For this several tests, the time length of each music is that test 1 is 3min 13 sec, test 2 is 4 min 56 sec , test 3 is 5 min 57 sec, test 4 is 4 min 35 sec. all of four music files are MP3 files, test 5 and 6 is a same file as 3 min 22 sec, but which is MPEG video. From the data of the asynchronous switching method of 1-4, the time from the start of the click to play normally is roughly by impacted by transcoding and playback, and is between 8.4 to 5.7. And in 6, 5 by the impact of a longer video transcoding, time began to play by 18.5 seconds.

In comparison of synchronous switching playing method and asynchronous switching playing method, we can clearly see the former in 1-4 MP3 page switching is longer than the latter, and if played 5,6 MPEG video file waiting time is as long as nearly 19.8 seconds, and asynchronous mode is page switching time significantly better than the former, and pictures and page interaction prompts the user, so the user experience is better than the former.

References

[1] Xianzhang Feng, Yanmei Cui, Zhiqiang Jiang and Cai Liu.2009.Design and implementation of network set-top box, Industrial Mechatronics and Automation International Conference on 2009,1:410-413.

[2] Ningkui Wang and Daijun Wei. 2014.From view of complex network: Fractal dimension of music notation, The 26th Chinese Control and Decision Conference (2014 CCDC),1:3647 - 3650.

[3] Hu Jianliang,Chen Xiao,Wang Jinlin and LI Ting yi.2004.Design and Implementation of an Embeded VOD System Based on B／S Structure,Video Engineering. Magri. China,1:56-58

[4] Xiao Qing and Wu Zhiming.2004.Research of IPTV Terminal Middleware,Telecommunications Science. Magri. China,4:49-53

[5] Weihua Xie and Yongbing Wang. 2009. Realization of JSE Application Method of IPTV STB,Management and Service Science, International Conference on MASS '09,1:1-3