An-Najah National University
Computer Engineering Department

RAS

Radio Automation System

By:

Ibrahim Dwaikat

Mais Abu-Higleh

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Introduction

IRAS, Internet Radio Automation System.

It provides a solution for the Radio Stations to broadcast the programs, songs, spots and other things without the need for managing these things manually.

It is a software that works automatically, and approximately it does not need the user a lot, just fill the database with songs, spots, jingles, programs….etc, then configure the scheduler for one week and will work for ever.

It supports automatic broadcasting and manual broadcasting, also it supports live broadcast from microphone or telephone or other multimedia devices.

You can record everything you broadcast , also you can record other things while broadcasting without effecting the broadcast.

In all types of audio file (songs, sweepers, spots…etc) you can set where you start the playing, where to stop and the period you prefer to put sweepers, all these things without effecting the original file.

The most important part which must be always running is the Studio, you can play anything manually, in the normal conditions, the studio will work automatically.

In every where you can make searching for any sound file you want.

Also you can use the wizard to confirm that the files exists on the hard disk (maybe deleted from the hard disk without deleting it from the database) so you can delete it from the database, or just disable it without deletion.

You can make money by spots, IRAS can calculate the costs of the spots for some period of time, based on number of seconds that the spot will be broadcasted or depending on the number of times to broadcast the spot.

For sweepers, you can determine on which category of songs the sweeper will played with.

Jingles are announcements for the Radio Station that can be broadcasted within a determined hour(s) on determined day(s).

You can add as many programs as you want, and you can add any number of episodes for the program. Also you can add Qur'an (Qur'an is different from regular programs).

Before some song category you may need to make some introduction, you can use the packets for that. Also this accepted for programs.

Sometimes you need to make a specific group of songs from different categories to be broadcasted at specific time, playlists provides this.

When you play songs, sweepers, songs with sweepers you may need to put an order for that, let's say on Sunday between 2-3: song then song thin sweeper, this pattern will be followed at that time every week.

You need to put the weekly scheduling for programs and songs, you can do that by Auto Scheduling form.

Our software supports pray (Al-Athan) for anywhere in the world, you can enable it to broadcast the Athan automatically.

This software supports multiple soundcards, one for playing the tests and the other for broadcasting.

For songs IRAS supports messaging system, you can send the code ID for the song by SMS and you increase the rating for that song.

For security issues, you must enter activation key only the first time you run IRAS, you can get the activation code from the software developers.

Finally you can back up the databases anytime you want, and restore it if an error happens.

By the next pages you will understand these concepts in more details.

General Concepts

Songs

A song is a musical composition. Songs contain vocal parts that are performed with the human voice and generally feature words (lyrics), commonly accompanied by other musical instruments. The words of songs are typically of a poetic, rhyming nature, although they may be religious verses or free prose.

A song can be putted in categories, you can also add a subvategory1 and/or subcategory2 for it, because some songs can be categorized in more than one category. Each song may have a subcategory1 and subcategory2. For example a song can be in main category "Pop" and subcategory1 "Old Pop" and subcategory2 "1970". Of course the main categories, subcategories1 and subcategories2 can be defined, added edited and deleted by the user, there are no limitations.

Also In each song you can enter the song name, surname, song album and singer sex.

The priority is how many times the song will be played, for example the priority of song A is 10, and B is 3; this means that A will be played 10 times but song B will be played 3 times. The priority (or can be called the Rank) can be increased by the Radio Listeners by sending SMS to the system, this SMS contains the code number of the song, because each song has a code that can be said before playing the song, you can enable the code reading or disable it for each song when you add the song or when you edit it. You can enable or disable saying all song's codes from the settings, also you can change the language of the code from the settings (English or Arabic).

Spots

Spots (or may called commercials) is something like payed advertisements, it is a full advertisement with the voice and the background music , it played from some date to another date, and the days can be determined, also broadcast time can be set. The cost can be calculated according to the number of seconds of the spot, or how many times the spot will be broadcast (charge per second or charge per spot).

Sweepers

A sweeper sound file is just the speech without the background music, the sweeper is mixed with the songs during the broadcasting. You can choose the song category and subcategory to mix the sweeper with. Also you can choose one song to mix the sweeper with.

Jingles

Jingle is an announcement or internal advertisement for the radio station. It is a full advertisement; speech with background music. You can choose which day(s) to broadcast the jingle, also the hour(s) that the jingle will be played on. For example if you choose 11:00AM this means that the jingle will be played in the period between (11:00AM-11:59AM).

Instants

Instants are a small duration files that you can play while Broadcasting, you can run them mixed or one each time.

Programs

Programs is the regular programs that the radio station broadcast, you can put a program and the episodes of the program. Of course you can choose the surname of the program.

Qur'an

Actually we deal with Qur'an files as a special case of programs, but IRAS studio will play Qur'an file in sequence, without looking for the Surname or the another else. For example if Shiekh Sudees read (Surat Al-fatiha), the next time IRAS will play Qur'an it will play (Surat Al-Baqara) , whatever the Shiekh.

Programs Packets

Every program needs intro music of sound file before broadcasting the program and/or after playing it. The Radio station must not add this intro to the program itself, they can make a separate file for intro, then by Programs Packets they can add it, and choose which category of programs, and may select also the program itself. You can add packet before and/or packet after the program.

Songs Packets

Some time you may need to broadcast at specific times per week a category and a subcategory of songs, with limited number of songs, and before broadcasting it, you need to broadcast: "Now we will broadcast pop for you", the Songs packets gives you the solution for that, choose the packet, category and subcategory and the priority range of the songs, and the time (per week) to broadcast and the number of songs to play.

Playlists

Sometime you need to play a specific order of songs, spots and jingle in someday, you need to prepare it before broadcasting time and save it so it will be played automatically, this is the playlists.

Pray (Al-Athan)

As its name shows, Al-Athan will be automatically played when the pray time enter. Of course you can enable or disable it from the settings. The times of Athan is calculated using many equations, so you can use IRAS in any place of the world, just choose which city you are in. There are two types of Athan files, Dawn and normal, you can change the files for them

Auto Scheduling

Here you can set the times for broadcasting (songs and programs), for example you can set that you will play (Rock) category with (1990) subcategory in Saturday between 2:00PM – 2:20PM and you will play some Program between 2:20PM – 3:00PM. Also here you can set Qur'an time(s).

Rotation

When playing songs period, jingles and sweepers can be added, so you can set the order of playing it, like (Jingle then Song then Song with sweeper … etc). You can choose rotation for anytime of the week. If you don't enter anything the default rotation will be taken: Song, Song, Song, Jingle, Song+Sweeper.

Fade mix

The fade mix means that when two songs played in sequence (one after another) a mixing will happen. This mix makes song1 volume fade out while song2 volume fades in.

File Confirm

For each type of sound files (song, jingle…. etc) there are a wizard that you can use to check if the files exists on the hard disk, and then you determine what to do: disable it so they will remain in the database but never played, or delete from the database, or do nothing.

Timing

Each sound file you entered has timing settings. These settings include Start time, so that you can set the place where you want the sound file start playing.

Mix time means the place that the sound file will stop.

Intro time is the time between start and mix, in the period between start and intro you can play the sweepers.

Why did we use…?

Why did we use C#?

- C# was derived from the C/C++ family of programming languages. C# was designed to overcome the limitations of both languages.
- C# and .Net in general has access to all the DLL files (while java hasn't).
- C# and .Net environment manage memory allocation.
- C# was designed to work with Windows, and our application uses Access database which runs under Windows.
- Our skills is very good in C#.

Why did we use MS-Access database?

- our data must be easily portable. Since Access is a local based program, we can take data wherever we like by just copying the file into a disk.
- We only need single user access to database
- The performance of Access is good for our application.
- Its compatible with SQL (structured query language).
- Access databases can be locked/protected to be secured to prevent from external changes

Brief description about main forms

Splash Screen

When you start IRAS, a splash screen appears showing some information, and indicating that the software is loading. It will disappear automatically.

Registration Screen

When you start IRAS for the first time it will ask you to enter the activation code, what you do is to send Registration Code to IRAS developing team and then they will send you the activation code.

This screen will appear just one time then if you rerun IRAS, it will not appear.

Note that registration and activation code depends on the computer hardware components (the motherboard) so if you try to apply the activation code on another computer IRAS will tell you that the activation code is invalid.

Studio Screen

Actually this screen is the most screen that will remain open while using IRAS because closing it means that there are not broadcasting.

In this screen there is a list that filled automatically with programs, songs, sweepers..etc depending on the time and the schedule of the radio station.

You can also fill it manually by clicking (Edit) button, then you can choose which things to fill (Songs, Song with sweeper, spots, Jingles and program), then you can click (Add) or (insert) buttons to add or insert the media file, and double click on the item in the table you can add it.

Note that in the list you can see the details for each media file like Duration, Air Time, category, subcategory, name and surname.

You can search for any type of media in the database using searching tools. Also you can add or delete or clear items from the list. Also you can choose any item then click (change) and choose any media file from the list and replace it.

While playing media file, a seek bar shows you the current position of the media file, you can click pause button any time you want to pause playing, and reclicking it will resume playing. You can bypass the current file by clicking play button. You can play any file in the list immediately by clicking the button on the left of that file (a number is written on the button)

To display information of any file in the list you can click it then click (info) button.

There is a volume meter that displays the volume amplitude value of the playing. Also there is an analog clock to show the time. Also there is a tool to set volume gain of the studio.

To insert packet(s) you can click (Packets) button then choose the packet then click (Enter Packet) button.

Instants screen

Another important thing is the instants, click on the (instants) button then you can see a table of buttons, right click on an empty one , then you can add an instant to it by browsing your files on the hard disk and choosing the color of that button.

If you right click on a filled button you can modify it by changing the file or the button name or color or other details.

To play an instant just left click on it.

By default when you click on two or more instants you can play them instantaneously, but if you click (Stop Mix) button, one instant only will be played, if you click an instant then another one the first one will stop.

To stop all instants immediately click on (Stop Instants).

You can rename groups by right clicking on the group name.

Songs Screens

Songs database

In this form you can search for songs, you can search by Song name, surname and album, also you can select in specific category, subcategory, subcategory2. Also you can filter your search to include only Disabled or/and frozen songs.

Adding Songs

To add songs click (Add) button from (Songs Database) screen or (Add Songs) from control panel screen.

In this form (screen) you can choose the media file (song file) and you can enter Song Name, surname, album, sex, song category, alternative category1, alternative category2, subcategory1, subcategory2 and priority.

Also you can set the file as enabled or disable, temp frozen, read the code number or not and enable fade mix.

From timing tab you can set start time, intro time and mix time

Editing Songs

You can double click on the song to edit it (or select the song and click edit button), same fields appeared when you added the song will appear.

Deleting songs

You can click delete button to delete the song from the database, IRAS will ask you if you are sure for that.

Add songs

In this form (screen) you can choose the media file (song file) and you can enter Song Name, surname, album, sex, song category, alternative category1, alternative category2, subcategory1, subcategory2 and priority.

Also you can set the file as enabled or disable, temp frozen, read the code number or not and enable fade mix.

From timing tab you can set start time, intro time and mix time

Add from folder

It is not necessary to add songs one by one, you can use this wizard. First choose the folder (you can check subfolders to include subfolders). Then select the files you want to add to the database, you can use (Select All), (Deselect All) and (Clear All) buttons.

When you choose a folder, if the files already entered no files will appear.

Then click (Next). For these songs choose the category, alternative category1, alternative category2, subcategory1, subcategory2 and priority.

If you want to add name, album, surname from ID3 click on this option. Also you can disable these files so you can enable it later. Also you can enable or disable fade mix and read code.

Clicking (Next) will add the files with the information to the database. You can finish the wizard or restart it.

Songs Categories

You can define categories for songs. You can add, edit and delete categories. Categories are three parts: Main Categories, subcategories1 and subcategories2.

Songs' Files existence confirm

In this form you can confirm if the files exist on the hard disk or was deleted. This thing is good to avoid misplaying of files by the studio later.

You can choose which action to do with the records in the database which deleted from the hard disk. You can do nothing, just see it or disable these files so you can enable them later or delete them from the database.

There is two boxes, the upper one shows the names of files in the database which the files exists in the hard disk. The lower one shows the names of the files do not exist on the hard disk, and behind each file name what action done.

Spots Screens

Spots database

In this form you can search for spots, you can search by Spot name and surname, also you can select in specific category and company. Also you can filter your search to include only Disabled spots.

Adding Spots

To add spots click (Add) button from (Spots Database) screen or (Add Spots) from control panel screen.

In this form (screen) you can choose the media file (spot file) and you can enter Spot Name, surname, company, category, priority, start time, stop time and RDS message.

You can enter Spots broadcast times, you can choose day(s) and time(s) to broadcast the spot. Also you can choose the type of paying, charge per play or charge per second. You can set charge per second value and charge per spot value. Automatically IRAS will calculate broadcasts per day, number of days to broadcast (depending on start time and stop time), total broadcasts, total seconds and total cost.

Also you can set the file as enabled or disable, Varied time spot, Start immediately and enable fade mix.

From timing tab you can set start time and mix time

Editing Spots

You can double click on the spot to edit it (or select the spot and click edit button), same fields appeared when you added the spot will appear.

Deleting spots

You can click delete button to delete the spot from the database, IRAS will ask you if you are sure for that.

Add spots

To add spots click (Add) button from (Spots Database) screen or (Add Spots) from control panel screen.

In this form (screen) you can choose the media file (spot file) and you can enter Spot Name, surname, company, category, priority, start time, stop time and RDS message.

You can enter Spots broadcast times, you can choose day(s) and time(s) to broadcast the spot. Also you can choose the type of paying, charge per play or charge per second. You can set charge per second value and charge per spot value. Automatically IRAS will calculate broadcasts per day, number of days to broadcast (depending on start time and stop time), total broadcasts, total seconds and total cost.

Also you can set the file as enabled or disable, Varied time spot, Start immediately and enable fade mix.

From timing tab you can set start time and mix time

Spots Categories

You can define categories for spots. You can add, edit and delete categories.

Spots Companies

You can define companies for spots. You can add, edit and delete companies.

Spots' Files existence confirm

In this form you can confirm if the files exist on the hard disk or was deleted. This thing is good to avoid misplaying of files by the studio later.

You can choose which action to do with the records in the database which deleted from the hard disk. You can do nothing, just see it or disable these files so you can enable them later or delete them from the database.

There is two boxes, the upper one shows the names of files in the database which the files exists in the hard disk. The lower one shows the names of the files do not exist on the hard disk, and behind each file name what action done.

Sweepers Screens

Sweepers database

In this form you can show the sweepers which connected to songs categories or connected for special song.

By Song Category

Adding Sweepers

To add sweeper click (Add) button.

In this form (screen) you can choose the media file (sweeper file) and you can enter Sweeper, producer, song category to play the sweeper with and subcategory to play the sweeper with

Also you can set the file as enabled or disable, and you can set timing: set start time and mix time.

You can make a test to check the entries so you can hear how the sweeper will be played with song as will be played in the studio. You can stop the test anytime you want by clicking (Stop Test) button.

Editing Sweepers

You can double click on the sweeper to edit it (or select the sweeper and click edit button), same fields appeared when you added the sweeper will appear.

Deleting sweepers

You can click delete button to delete the sweeper from the database, IRAS will ask you if you are sure for that.

For Special Song

Adding Sweepers

To add sweeper click (Add) button.

In this form (screen) you can choose the media file (sweeper file) and you can enter Sweeper, producer and the song you will play this sweeper with, this will open a search form like one shown in Songs Database, Search for a song you want then click OK.

Also you can set the file as enabled or disable, and you can set timing: set start time and mix time.

You can make a test to check the entries so you can hear how the sweeper will be played with song as will be played in the studio. You can stop the test anytime you want by clicking (Stop Test) button.

Editing Sweepers

You can double click on the sweeper to edit it (or select the sweeper and click edit button), same fields appeared when you added the sweeper will appear.

Deleting sweepers

You can click delete button to delete the sweeper from the database, IRAS will ask you if you are sure for that.

Sweepers' Files existence confirm

In this form you can confirm if the files exist on the hard disk or was deleted. This thing is good to avoid misplaying of files by the studio later.

You can choose which action to do with the records in the database which deleted from the hard disk. You can do nothing, just see it or disable these files so you can enable them later or delete them from the database.

There is two boxes, the upper one shows the names of files in the database which the files exists in the hard disk. The lower one shows the names of the files do not exist on the hard disk, and behind each file name what action done.

Jingles Screens

Jingles database

In this form you can search for jingles, you can search by jingles name and surname, also you can select in specific category. Also you can filter your search to include only Disabled jingles.

Adding Jingles

To add jingles click (Add) button from (jingles Database) screen or (Add jingles) from control panel screen.

In this form (screen) you can choose the media file (jingle file) and you can enter Jingle Name, surname and category.

Also you can set the file as enabled or disabled. You can set timing by setting start time and mix time.

You can enter broadcast times by clicking the button, you can choose day(s) and hours(s) to broadcast it.

Editing Jingles

You can double click on the jingle to edit it (or select the jingle and click edit button), same fields appeared when you added the jingle will appear.

Deleting jingles

You can click delete button to delete the jingle from the database, IRAS will ask you if you are sure for that.

Add jingles

To add jingles click (Add) button from (jingles Database) screen or (Add jingles) from control panel screen.

In this form (screen) you can choose the media file (jingle file) and you can enter Jingle Name, surname and category.

Also you can set the file as enabled or disabled. You can set timing by setting start time and mix time.

You can enter broadcast times by clicking the button, you can choose day(s) and hours(s) to broadcast it.

Jingles Categories

You can define categories for jingles. You can add, edit and delete jingles.

Jingles' Files existence confirm

In this form you can confirm if the files exist on the hard disk or was deleted. This thing is good to avoid misplaying of files by the studio later.

You can choose which action to do with the records in the database which deleted from the hard disk. You can do nothing, just see it or disable these files so you can enable them later or delete them from the database.

There is two boxes, the upper one shows the names of files in the database which the files exists in the hard disk. The lower one shows the names of the files do not exist on the hard disk, and behind each file name what action done.

Programs Screens

Programs database

In this form you can search for programs, you can search by program name, surname and sequence number of the song, also you can search in specific category and specific program. Also you can filter your search to include only Disabled programs.

Adding Programs

To add programs click (Add) button from (Programs Database) screen or (Add Programs) from control panel screen.

In this form (screen) you can choose the media file (programs file) and you can enter Episode Name, program category, program name, surname and Episode sequence number. In the right there is a box displays the sequence number of the entered episodes.

You can define program categories for programs by clicking (…) button next to Program Category field. You can add, edit and delete categories.

You can define programs name for programs by clicking (…) button next to Program Name field. You can add, edit and delete Names.

You can define program surnames for programs by clicking (…) button next to Program surnames field. You can add, edit and delete surnames.

Also you can set the file as enabled or disable and start immediately or not.

From timing tab you can set start time, intro time and mix time

Editing programs

You can double click on the program to edit it (or select the program and click edit button), same fields appeared when you added the program will appear.

Deleting programs

You can click delete button to delete the program from the database, IRAS will ask you if you are sure for that.

Add Program Episodes

To add programs click (Add) button from (Programs Database) screen or (Add Programs) from control panel screen.

In this form (screen) you can choose the media file (programs file) and you can enter Episode Name, program category, program name, surname and Episode sequence number. In the right there is a box displays the sequence number of the entered episodes.

You can define program categories for programs by clicking (…) button next to Program Category field. You can add, edit and delete categories.

You can define programs name for programs by clicking (…) button next to Program Name field. You can add, edit and delete Names.

You can define program surnames for programs by clicking (…) button next to Program surnames field. You can add, edit and delete surnames.

Also you can set the file as enabled or disable and start immediately or not.

From timing tab you can set start time, intro time and mix time

Programs Categories

You can define categories for programs. You can add, edit and delete categories.

Packets Screens

Songs Packets

In this form you can search for song packets, you can search by Packet title, also you can search in specific priority, category, subcategory and subcategory2. You can choose the number of songs associated with the packet. You can select which days the packet will be played. Also you can filter your search to include only Disabled packets.

Adding Songs Packets

To add Songs Packets click (Add) button from (Songs Packets Database) screen.

In this form (screen) you can choose the media file (Song Packet file) and you can enter Song Packet Title, priority, category, subcategory1, subcategory2, from priority, to priority and number of songs.

You can choose broadcast times by clicking the button. You can choose the day(s) and the time(s).

Also you can set the file as enabled or disable, must play or not and enable fade mix.

From timing tab you can set start time, intro time and mix time

Editing Songs Packets

You can double click on the song packet to edit it (or select the song packet and click edit button), same fields appeared when you added the song packet will appear.

Deleting songs Packets

You can click delete button to delete the song packets from the database, IRAS will ask you if you are sure for that.

Programs Packets

In this form you can search for programs packets, you can search by category, also you can search in specific subcategory. Also you can filter your search to include only Disabled packets.

Adding Programs Packets

To add Programs Packets click (Add) button from (Programs Packets Database) screen.

In this form (screen) you can choose the media file (Program Packet file) for packet before the program and the packet after the program, and you can choose program category and subcategory.

Also you can set the packet as enabled or disable and enable fade mix.

From timing start time and mix time for the packet before and after.

Editing Programs Packets

You can double click on the program packet to edit it (or select the program packet and click edit button), same fields appeared when you added the program packet will appear.

Deleting Program Packets

You can click delete button to delete the program packets from the database, IRAS will ask you if you are sure for that.

Auto Program Screens

Auto Scheduling

In this form you can set the scheduling for the week, you can set songs times, programs times and rebroadcast times.

First you must choose the day. Then you can add for the time songs, by selecting songs categories, subcategories1 and subcategories2 and the priority for the songs. You can enter ten songs categories for each half hour.

Also you can enter programs times by selecting program category and program name and selecting start time of the program. Also you can choose if the broadcast of the program is sequential (new episode) or repeat.

You can enter rebroadcast, it will cover half hour.

You can find songs or programs by selecting Song Category and song subcategory and program category from (Find By) area.

You can delete any block you want, any program and any song category. Also you can clear day or clear the entire week.

Rotations

For each hour in each day you can enter the rotation, you can add any rotation you want by selecting (Song or Jingle or Song+Sweeper). You can delete any item, you can copy and paste rotation for hour and for entire day. You can Add the defaults (Song, Song, Song, Jingle, Song+Sweeper). You can also clear hour rotation, day rotations and the entire week rotations.

Playlists

In this form you can search playlist, you can search by Packet name.

Adding Playlists

To add Playlists click (New Playlist) button from (Playlists Database) screen.

In this form (screen) you can enter the playlist name, by default the name is (Playlist: [Date][Time])

Editing Playlists

You can double click on the Playlists to edit it (or select the Playlists and click edit button).

In this screen there is a list that can be filled by Songs, Spots and jingles manually. You can fill it by choosing which things to fill (Songs, Song with sweeper, spots and Jingles), then you can click (Add) or (insert) buttons to add or insert the media file, and double click on the item in the table you can add it.

Note that in the list you can see the details for each media file like Duration, Air Time, category, subcategory, name and surname.

You can search for any type of media in the database using searching tools. Also you can add or delete or clear items from the list. Also you can choose any item then click (change) and choose any media file from the list and replace it.

You can set broadcast date(s) and time(s) for the playlist. Also you can add comments for the playlist.

Deleting Playlists

You can click delete button to delete the playlists from the database, IRAS will ask you if you are sure for that.

Misc Screens

Settings

General

Here you can set Studio starting mode, can be Auto program, rebroadcast or Live Assist. Also you can set Daylight saving time which is used in calculating Pray times.

Language

You can set the language for Songs Code Reading to Arabic, English or you can disable code reading.

Interface Color

You can set the IRAS colors theme, there are three choices: Black, silver or blue.

Playback

You can choose the second soundcard (if you installed more than one soundcard) this soundcard will be used in Studio for broadcasting during it.

Also you can set fade mix time between 0 and 10.

And you can set the volume of song while playing sweeper, the value can be between 0% to 100%.

Pray

Here you can see praying times. You can choose the city you are broadcasting from (because pray times differ from place to place). Also you can set Al-Mathhab (المذهب) for calculating Pray times.

Mixer

The mixer is actually a form like (Volume Control) in Microsoft Windows. You can set the outputs volumes and input volumes for each sound card.

Sound Recording

IRAS supports sound recording, you can select which soundcard you want to record from, Sample Rate, Channels, Resolution and the output file (which must be wav). You can convert it to MP3 using File converter.

File Converter

WAV to MP3

You can convert WAV files to MP3 files, the configurations of the MP3 will be as the input MP3 file.

MP3 to WAV

In some cases the user needs to convert MP3 to WAV, so you can use this tool.

Athan Files

Here you can set Pray (Athan) files, two files; one if for Dawn Pray, and the other is for other prays.

Backup and recovery

You can make backups for databases any time you want, just click backup, choose the place to save files and wait some seconds until it finish the processing.

Also you can recover (restore) from backed up databases, click restore and choose the folder contains the backup.

SMS service

This feature enables the listeners (people) to send the code number for the song to vote it and increase its rating. It supports the following Nokia models: 1100, 2100, 3100, 3105, 3108, 3200, 3210, 3300, 3310, 3330, 3350, 3390, 3410, 3510, 3510i, 3560, 3570, 3585, 3585i, 3586, 3590, 3595, 3610, 5100, 5110, 5130, 5190, 5210, 5510, 6100, 6108, 6110, 6150, 6190, 6200, 6210, 6220, 6250, 6310, 6310i, 6340, 6340i, 6510, 6560, 6590, 6610, 6650, 6800, 7110, 7190, 7210, 7250, 7250i, 8210, 8250, 8290, 8310, 8390, 8810, 8850, 8855, 8890, 8910, 8910i.

Also you can connect your ordinary mobile with this connections: DAU-9P (F-Bus), DLR-3, InfraRed, Bluetooth and DKU-5. Also you can use any port from COM1 to COM5.

When you receive a new message it will notify you and will show you the sender number, and the content of the MSG and the time when the message received. It will tell you that the rating succeeded or not.

About

Will see you some information about IRAS.

IRAS implementation and functionality

Multiple soundcards

IRAS supports playing on multiple soundcards at the same time, so you can broadcast on one soundcard, and add songs, spots..etc and test it and hear it on the other sound card without effecting the broadcast.

All what you need after installing your second sound card is to select the second sound card from settings.

Reading ID3 for MP3 files

ID3 is a metadata container most often used in conjunction with the MP3 audio file format. It allows information such as the title, artist, album, track number, or other information about the file to be stored in the file itself.

ID3 Tag standard = 128 bytes of text divided into 6 fields which can be added on end of MP3 file. This standard was created by NamkraD in 1996.

ID3 Tag begins on position -128 bytes from end of file. If there is an ID3 Tag identifier - "TAG" on position 0, then the ID3 Tag is already appended.

Fields carry data:

Byte	3 - 32	33 - 62	63 - 92	93 - 96	97 - 126	127
Field name	Track name	Artist name	Album name	Year	Comment	Genre

DirectSound

DirectSound is a software component of the DirectX library, supplied by Microsoft, that resides on a computer with the Windows operating system. It provides a direct interface between applications and the sound card drivers on Windows XP and earlier operating systems, enabling applications to produce sounds and music. Besides providing the essential service of passing audio data to the sound card, it provides many needed capabilities such as recording and mixing sound; adding effects to sound e.g. reverb, echo, flange; using hardware controlled buffers for extra speed; positioning sounds in 3D space (3D audio specialization), capturing sounds from a microphone or other input and controlling capture effects during audio capture. Of these audio mixing and volume control are the most essential.

DirectSound also allows several applications to conveniently share access to the sound card at the same time. Its ability to play sound in 3D added a new dimension to games. It also provides the ability for games to modify a musical script in response to game events in real time, ie: the beat of the music could quicken as the action heats up.

Media Control Interface, MCI

The Media Control Interface, MCI in short, is an aging API for controlling multimedia peripherals connected to a Microsoft Windows or OS/2 computer. MCI makes it very simple to write a program which can play a wide variety of media files and even to record sound by just passing commands as strings. It uses relations described in Windows registries or in the [MCI] section of the file SYSTEM.INI.

The MCI interface is a high-level API developed by Microsoft and IBM for controlling multimedia devices, such as CD-ROM players and audio controllers.

Pray time calculations

To calculate the prayer times for a certain place we need to know the latitude (B) and longitude (L) of the location and its reference longitude (R), which is the Longitude from which a time zone is based. B and L may be obtained from an atlas and R may be calculated by multiplying 15 by the difference between local time and GMT (i.e. 15 x Time Zone).

(Basic time zones are 15 Degrees of longitude apart: 360º/24H = 15 Degrees/H)

We also need to know two astronomical measures called the declination angle of the sun (D) and the real time-mean time difference, also known as the equation of time (T).

Declination is the angular distance between a celestial object and the celestial equator. The Declination and the Right Ascension are used together to give the position of a star with reference to the celestial equator and the vernal equinox respectively.

The equation of time is a correction to be added to the apparent solar time, as read on a sundial, to obtain mean solar time, as commonly used. This difference is a consequence of the ellipticity and tilt of the Earth's orbit, causing the irregular apparent movement of the Sun across the sky.

J	Day of Year		**B**	Latitude (Degrees)	
D	Solar Declination (Degrees)		**L**	Longitude (Degrees)	
T	Equation of Time (Minutes)		**TZ**	Time Zone (Hours)	
Gd	Dawn's Twilight Angle (15°-19°)		**R**	Reference Longitude (Degrees)	
Gn	Night's Twilight Angle (15°-19°)		**Sh**	Sh=1 (Shafii) - Sh=2 (Hanafi)	

J is the Day of Year, for example {Jan 01→ J=0}; {Jan 31→ J=30}, {Feb 1→ J=31}

H is the height above sea level in meters.

The algorithms to calculate T and D are shown below:

$$\beta = \frac{2\mu(J)}{365} \qquad \text{(Year Angle)}$$

D =	T =
$\frac{180}{\mu} * \{0.006918$ $-[0.399912 * Cos[\beta]] +$ $[0.070257 * Sin[\beta]]$ $-[0.006758 * Cos[2 * \beta]] +$ $[0.000907 * Sin[2 * \beta]]$ $-[0.002697 * Cos[3 * \beta]] +$ $[0.001480 * Sin[3 * \beta]]\}$	$229.18 * \{0.000075$ $+[0.001868 * Cos[\beta]] - [0.032077 * Sin[\beta]]$ $-[0.014615 * Cos[2 * \beta]] -$ $[0.040849 * Sin[2 * \beta]]\}$

R=15*TZ (Degrees),   G=18 (Degrees)   H (Meters) is the altitude above sea level.

The following equations may be used to calculate the prayer times: Z, U,V, and W are Hours.

$$Z = 12 + \frac{R - L}{15} - \frac{T}{60}$$

$$U = \frac{180}{15 * \mu} * ArcCos \left[\frac{Sin[(-0.8333 - 0.0347 * Sign(H) * Abs(H)^{0.5}) * \frac{\mu}{180}] - Sin\left[D * \frac{\mu}{180}\right] * Sin\left[B * \frac{\mu}{180}\right]}{Cos\left[D * \frac{\mu}{180}\right] * Cos\left[B * \frac{\mu}{180}\right]} \right]$$

Abs(H): is the absolute value of H.   Sign(H): is the sign of H or H/Abs(H)

$$Vd = \frac{180}{15 * \mu} * ArcCos \left[\frac{-Sin\left[Gd * \frac{\mu}{180}\right] - Sin\left[D * \frac{\mu}{180}\right] * Sin\left[B * \frac{\mu}{180}\right]}{Cos\left[D * \frac{\mu}{180}\right] * Cos\left[B * \frac{\mu}{180}\right]} \right]$$

$$Vn = \frac{180}{15 * \mu} * ArcCos\left[\frac{- Sin\left[Gn * \frac{\mu}{180}\right] - Sin\left[D * \frac{\mu}{180}\right] * Sin\left[B * \frac{\mu}{180}\right]}{Cos\left[D * \frac{\mu}{180}\right] * Cos\left[B * \frac{\mu}{180}\right]}\right]$$

$$W = \frac{180}{15 * \mu} * ArcCos\left[\frac{Sin\left[ArcCot\left[Sh + Tan\left[Abs(B - D) * \frac{\mu}{180}\right]\right]\right] - Sin\left[D * \frac{\mu}{180}\right] * Sin\left[B * \frac{\mu}{180}\right]}{Cos\left[D * \frac{\mu}{180}\right] * Cos\left[B * \frac{\mu}{180}\right]}\right]$$

الفجر	Dawn	=	Z-Vd
الشروق	Sunrise	=	Z-U
الظهر	Noon	=	Z
العصر	Afternoon	=	Z+W
المغرب	Sunset	=	Z+U
العشاء	Dusk	=	Z+Vn

$$ArcCot[x] = ArcTan\left[\frac{1}{x}\right]$$

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Huffman coding

In computer science and information theory, Huffman coding is an entropy encoding algorithm used for lossless data compression. The term refers to the use of a variable-length code table for encoding a source symbol (such as a character in a file) where the variable-length code table has been derived in a particular way based on the estimated probability of occurrence for each possible value of the source symbol. It was developed by David A. Huffman while he was a Ph.D. student at MIT, and published in the 1952 paper "A Method for the Construction of Minimum-Redundancy Codes." Huffman became a member of the MIT faculty upon graduation and was later the founding member of the Computer Science Department at the University of California, Santa Cruz.

Huffman coding uses a specific method for choosing the representation for each symbol, resulting in a prefix-free code (sometimes called "prefix codes") (that is, the bit string representing some particular symbol is never a prefix of the bit string representing any other symbol) that expresses the most common characters using shorter strings of bits than are used for less common source symbols. Huffman was able to design the most efficient compression method of this type: no other mapping of individual source symbols to unique strings of bits will produce a smaller average output size when the actual symbol frequencies agree with those used to create the code. A method was later found to do this in linear time if input probabilities (also known as weights) are sorted.

For a set of symbols with a uniform probability distribution and a number of members which is a power of two, Huffman coding is equivalent to simple binary block encoding, e.g., ASCII coding. Huffman coding is such a widespread method for creating prefix-free codes that the term "Huffman code" is widely used as a synonym for "prefix-free code" even when such a code is not produced by Huffman's algorithm.

Although Huffman coding is optimal for a symbol-by-symbol coding with a known input probability distribution, its optimality can sometimes accidentally be over-stated. For example, arithmetic coding and LZW coding often have better compression capability. Both these methods can combine an arbitrary number of symbols for more efficient coding, and generally adapt to the actual input statistics, the latter of which is useful when input probabilities are not precisely known or vary significantly within the stream.

Wave File

WAVE File Format is a file format for storing digital audio (waveform) data. It supports a variety of bit resolutions, sample rates, and channels of audio. This format is very popular upon IBM PC (clone) platforms, and is widely used in professional programs that process digital audio waveforms. It takes into account some peculiarities of the Intel CPU such as little endian byte order.
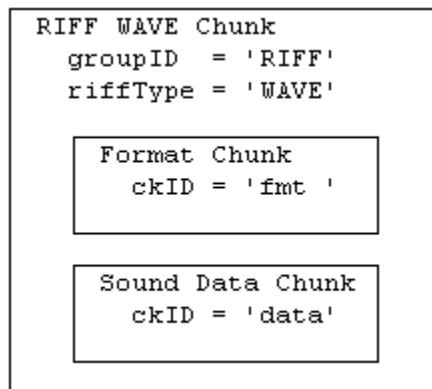
File Structure

A WAVE file is a collection of a number of different types of chunks. There is a required Format ("fmt ") chunk which contains important parameters describing the waveform, such as its sample rate. The Data chunk, which contains the actual waveform data, is also required. All other chunks are optional. Among the other optional chunks are ones which

define cue points, list instrument parameters, store application-specific information, etc. All of these chunks are described in detail in the following sections of this document.

There are no restrictions upon the order of the chunks within a WAVE file, with the exception that the Format chunk must precede the Data chunk. Some inflexibly written programs expect the Format chunk as the first chunk (after the RIFF header) although they shouldn't because the specification doesn't require this.

Here is a graphical overview of an example, minimal WAVE file. It consists of a single WAVE containing the 2 required chunks, a Format and a Data Chunk.

```
RIFF WAVE Chunk
   groupID  = 'RIFF'
   riffType = 'WAVE'

   ┌─────────────────────────┐
   │  Format Chunk           │
   │     ckID = 'fmt '       │
   └─────────────────────────┘

   ┌─────────────────────────┐
   │  Sound Data Chunk       │
   │     ckID = 'data'       │
   └─────────────────────────┘
```
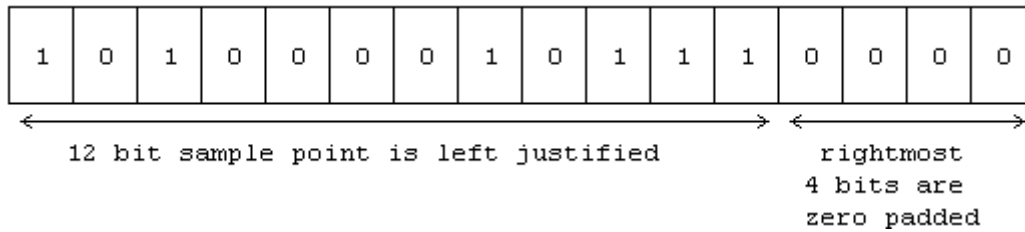
Sample Points and Sample Frames

A large part of interpreting WAVE files revolves around the two concepts of sample points and sample frames.

A sample point is a value representing a sample of a sound at a given moment in time. For waveforms with greater than 8-bit resolution, each sample point is stored as a linear, 2's-complement value which may be from 9 to 32 bits wide (as determined by the wBitsPerSample field in the Format Chunk, assuming PCM format -- an uncompressed format). For example, each sample point of a 16-bit waveform would be a 16-bit word (ie, two 8-bit bytes) where 32767 (0x7FFF) is the highest value and -32768 (0x8000) is the lowest value. For 8-bit (or less) waveforms, each sample point is a linear, unsigned byte where 255 is the highest value and 0 is the lowest value. Obviously, this signed/unsigned sample point discrepancy between 8-bit and larger resolution waveforms was one of those "oops" scenarios where some Microsoft employee decided to change the sign sometime after 8-bit wave files were common but 16-bit wave files hadn't yet appeared.

Because most CPU's read and write operations deal with 8-bit bytes, it was decided that a sample point should be rounded up to a size which is a multiple of 8 when stored in a WAVE. This makes the WAVE easier to read into memory. If your ADC produces a sample point from 1 to 8 bits wide, a sample point should be stored in a WAVE as an 8-bit byte (ie, unsigned char). If your ADC produces a sample point from 9 to 16 bits wide, a sample point should be stored in a WAVE as a 16-bit word (ie, signed short). If your ADC produces a sample point from 17 to 24 bits wide, a sample point should be stored in a WAVE as three bytes. If your ADC produces a sample point from 25 to 32 bits wide, a sample point should be stored in a WAVE as a 32-bit doubleword (ie, signed long). Etc.

Furthermore, the data bits should be left-justified, with any remaining (ie, pad) bits zeroed. For example, consider the case of a 12-bit sample point. It has 12 bits, so the sample point must be saved as a 16-bit word. Those 12 bits should be left-justified so that they

become bits 4 to 15 inclusive, and bits 0 to 3 should be set to zero. Shown below is how a 12-bit sample point with a value of binary 101000010111 is formatted left-justified as a 16-bit word.

```
┌───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┬───┐
│ 1 │ 0 │ 1 │ 0 │ 0 │ 0 │ 0 │ 1 │ 0 │ 1 │ 1 │ 1 │ 0 │ 0 │ 0 │ 0 │
└───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┴───┘
 ←─────────────────────────────────────────────→  ←───────────→
    12 bit sample point is left justified           rightmost
                                                    4 bits are
                                                    zero padded
```

But note that, because the WAVE format uses Intel little endian byte order, the LSB is stored first in the wave file as so:

```
┌───┬───┬───┬───┬───┬───┬───┬───┐    ┌───┬───┬───┬───┬───┬───┬───┬───┐
│ 0 │ 1 │ 1 │ 1 │ 0 │ 0 │ 0 │ 0 │    │ 1 │ 0 │ 1 │ 0 │ 0 │ 0 │ 0 │ 1 │
└───┴───┴───┴───┴───┴───┴───┴───┘    └───┴───┴───┴───┴───┴───┴───┴───┘
 ←───────────→  ←───────────→         ←─────────────────────────────→
  bits 0 to 3    4 pad bits                    bits 4 to 11
```
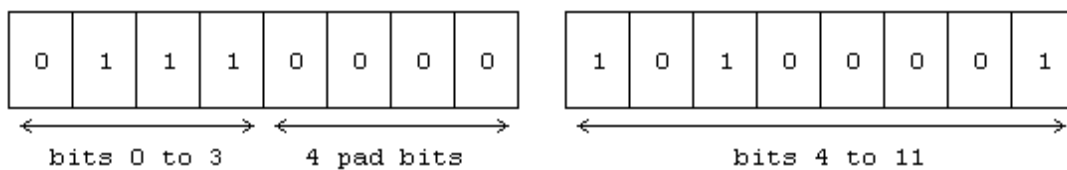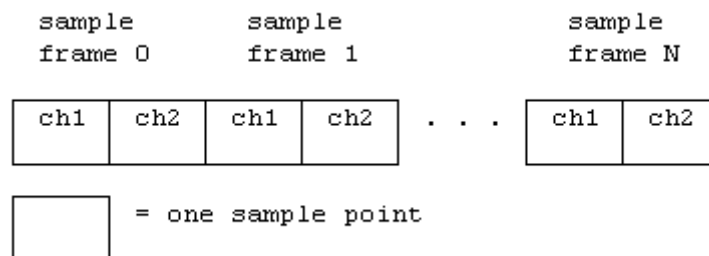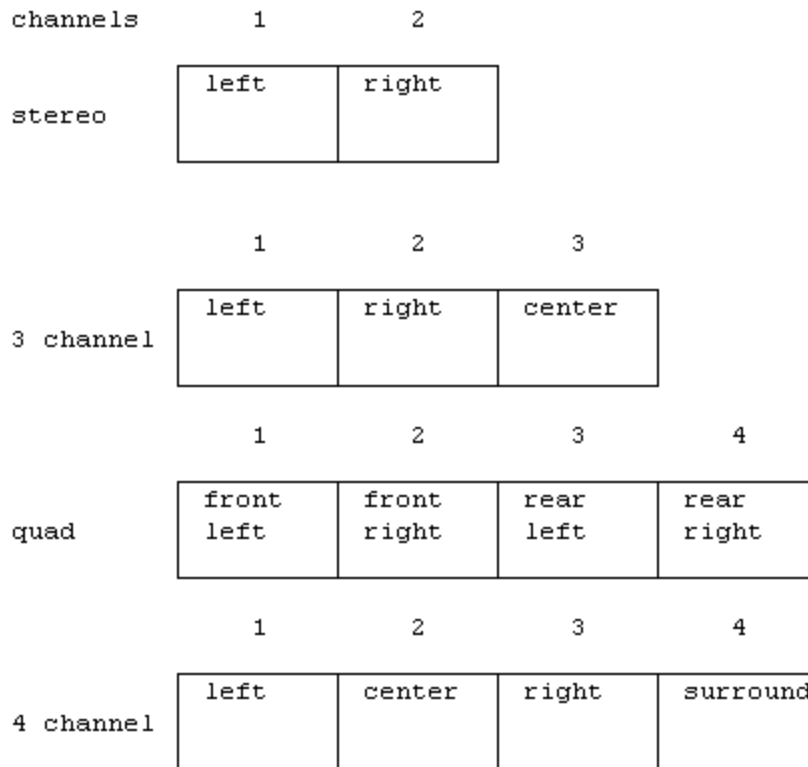
For multichannel sounds (for example, a stereo waveform), single sample points from each channel are interleaved. For example, assume a stereo (ie, 2 channel) waveform. Instead of storing all of the sample points for the left channel first, and then storing all of the sample points for the right channel next, you "mix" the two channels' sample points together. You would store the first sample point of the left channel. Next, you would store the first sample point of the right channel. Next, you would store the second sample point of the left channel. Next, you would store the second sample point of the right channel, and so on, alternating between storing the next sample point of each channel. This is what is meant by interleaved data; you store the next sample point of each of the channels in turn, so that the sample points that are meant to be "played" (ie, sent to a DAC) simultaneously are stored contiguously.

The sample points that are meant to be "played" (ie, sent to a DAC) simultaneously are collectively called a **sample frame**. In the example of our stereo waveform, every two sample points makes up another sample frame. This is illustrated below for that stereo example.

```
    sample            sample                  sample
    frame 0           frame 1                 frame N

  ┌─────┬─────┬─────┬─────┐           ┌─────┬─────┐
  │ ch1 │ ch2 │ ch1 │ ch2 │  . . .    │ ch1 │ ch2 │
  └─────┴─────┴─────┴─────┘           └─────┴─────┘

  ┌─────┐
  │     │  = one sample point
  └─────┘
```

For a monophonic waveform, a sample frame is merely a single sample point (ie, there's nothing to interleave). For multichannel waveforms, you should follow the conventions shown below for which order to store channels within the sample frame. (ie, Below, a single sample frame is displayed for each example of a multichannel waveform).

```
channels          1           2

              ┌─────────┬─────────┐
              │ left    │ right   │
stereo        │         │         │
              └─────────┴─────────┘


              1           2           3

              ┌─────────┬─────────┬─────────┐
              │ left    │ right   │ center  │
3 channel     │         │         │         │
              └─────────┴─────────┴─────────┘


              1           2           3           4

              ┌─────────┬─────────┬─────────┬─────────┐
              │ front   │ front   │ rear    │ rear    │
quad          │ left    │ right   │ left    │ right   │
              └─────────┴─────────┴─────────┴─────────┘


              1           2           3           4

              ┌─────────┬─────────┬─────────┬─────────┐
              │ left    │ center  │ right   │ surround│
4 channel     │         │         │         │         │
              └─────────┴─────────┴─────────┴─────────┘
```

The sample points within a sample frame are packed together; there are no unused bytes between them. Likewise, the sample frames are packed together with no pad bytes.

Note that the above discussion outlines the format of data within an uncompressed data chunk. There are some techniques of storing compressed data in a data chunk. Obviously, that data would need to be uncompressed, and then it will adhere to the above layout.

MPEG-1 Audio Layer 3 (MP3)

MPEG-1 Audio Layer 3, more commonly referred to as MP3, is an audio encoding format.

It uses a lossy compression algorithm that is designed to greatly reduce the amount of data required to represent the audio recording, yet still sound like a faithful reproduction of the original uncompressed audio to most listeners. It was invented by a team of European engineers at Philips, CCETT (Centre commun d'études de télévision et télécommunications), IRT and Fraunhofer Society, who worked in the framework of the EUREKA 147 DAB digital radio research program, and it became an ISO/IEC standard in 1991.

MP3 is an audio-specific format. The compression removes certain parts of sound that are outside the hearing range of most people. It provides a representation of pulse-code modulation — encoding audio in much less space than straightforward methods, by using psychoacoustic models to discard components less audible to human hearing, and

recording the remaining information in an efficient manner. This is quite different from the principles used by, say, JPEG, an image compression format, which are purely frequency domain based.

Bit rate

Several bit rates are specified in the MPEG-1 Layer 3 standard: 32, 40, 48, 56, 64, 80, 96, 112, 128, 144, 160, 192, 224, 256 and 320 kbit/s, and the available sampling frequencies are 32, 44.1 and 48 kHz. A sample rate of 44.1 kHz is almost always used since this is also used for CD audio, the main source used for creating MP3 files. A greater variety of bit rates are used on the Internet. 128 kbit/s is the most common since it typically offers very good audio quality in a relatively small space. 192 kbit/s is often used by those who notice artifacts at lower bit rates. Although, as the Internet availability increased, and hard drive sizes have increased as well, 128kbit/s bitrate is slowly being replaced with higher bitrates like 192kbit/s, and more and more with top quality files encoded at 320kbit/s.

By contrast, uncompressed audio as stored on a compact disc has a bit rate of 1,411.2 kbit/s (16 bits/sample × 44100 samples/second × 2 channels / 1000 bits/kilobit).
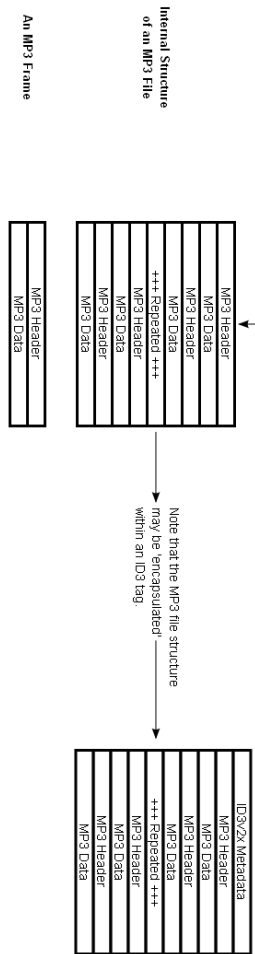
Some additional bit rates and sample rates were made available in the MPEG-2 and the (unofficial) MPEG-2.5 standards: bit rates of 8, 16, 24, and 144 kbit/s and sample rates of 8, 11.025, 12, 16, 22.05 and 24 kHz.

Non-standard bit rates up to 640 kbit/s can be achieved with the LAME encoder and the free format option, but few MP3 players can play those files. Gabriel Bouvigne, a principal developer of the LAME project, says that the free format option is compliant with the standard but, according to the standard, decoders are only required to be able to decode streams up to 320 kbit/s

File structure

An MP3 file is made up of multiple MP3 frames, which consist of the MP3 header and the MP3 data. This sequence of frames is called an Elementary stream. Frames are independent items: one can cut the frames from a file and an MP3 player would be able to play it. The MP3 data is the actual audio payload. The diagram shows that the MP3 header consists of a sync word, which is used to identify the beginning of a valid frame. This is followed by a bit indicating that this is the MPEG standard and two bits that indicate that layer 3 is being used, hence MPEG-1 Audio Layer 3 or MP3. After this, the values will differ depending on the MP3 file. ISO/IEC 11172-3 defines the range of values for each section of the header along with the specification of the header. Most MP3 files today contain ID3 metadata, which precedes or follows the MP3 frames; this is also shown in the diagram.

An MP3 File

Internal Structure of an MP3 File

MP3 File
MP3 Header
MP3 Data
MP3 Header
MP3 Data
MP3 Header ++ Repeated +++
MP3 Data
MP3 Header
MP3 Data
MP3 Header
MP3 Data

Note that the MP3 file structure may be 'encapsulated' within an ID3 tag

ID3v2x Metadata
MP3 Header
MP3 Data
MP3 Header
MP3 Data ++ Repeated +++
MP3 Header
MP3 Data
MP3 Header
MP3 Data

An MP3 Frame

MP3 Header
MP3 Data

Example MP3 Header

FFFBA040

Colour-coding shows binary bit mapping to hex values below

Detail of an MP3 Header

Bits	Binary	Hex	Meaning	Value
1–12	1111 1111 1111	F F F	MP3 Sync Word	Sync Word
13	1	B (13–16)	Version	1 = MPEG
14–15	01		Layer	01 = Layer 3
16	1		Error Protection	1 = No
17–20	1010	A	Bit Rate	1010 = 160
21–22	00	0 (21–24)	Frequency	00 = 44100 Hz
23	0		Pad Bit	0 = Frame is not padded
24	0		Priv. Bit	Unknown
25–26	01	4 (25–28)	Mode	01 = Joint Stereo
27–28	00		Mode Extension (Used With Joint Stereo)	0 = Intensity Stereo Off / 0 = MS Stereo Off
29	0	0 (29–32)	Copy	0 = Not Copy-righted
30	0		Original Media	0 = Copy Of Original Media
31–32	00		Emphasis	00 = None

SMS messages

We added the feature that the people can send SMS to rate songs by sending the song code number. For that purpose we used Mobile ActiveX Control which designed to give an access to various Nokia phone capabilities from a Windows program.

Mobile ActiveX Control works with the following Nokia models: 1100, 2100, 3100, 3105, 3108, 3200, 3210, 3300, 3310, 3330, 3350, 3390, 3410, 3510, 3510i, 3560, 3570, 3585, 3585i, 3586, 3590, 3595, 3610, 5100, 5110, 5130, 5190, 5210, 5510, 6100, 6108, 6110, 6150, 6190, 6200, 6210, 6220, 6250, 6310, 6310i, 6340, 6340i, 6510, 6560, 6590, 6610, 6650, 6800, 7110, 7190, 7210, 7250, 7250i, 8210, 8250, 8290, 8310, 8390, 8810, 8850, 8855, 8890, 8910, 8910i.

An event is fired when new message received, so we read the message and the sender mobile number (not saved), then the song rating increased by 1 for each message.

Other features

Registration and activation

For security reason (illegal copying of the software) IRAS requests from the user only first time starting to enter the activation code.

The idea of that is reading the motherboard serial number then entering this number to some function (we defined it), then it will give a number, the user sends this number to IRAS development team, then they will send the activation code for that number, then the use enters that number in the activation field. The activation number is saved in the registry so that IRAS will read it from the registry to avoid entering it each time the user starts the program.

Code reader languages

For each song you can enable reading code number, from settings you can choose the language for the reader (Arabic or English)

Themes

IRAS supports themes. Three themes included: Blue, Black and Silver.

Recommendations

We recommend to add the following features for the program:

1. Streaming over internet. We didn't do it because we can't convert the audio format to global (standard) format like (ASF), we made streaming over the network but in the client side (listener to the radio) we used an application build by us, this means that the listeners must get our player (download it from the IRAS website for example) and they must have (.NET Framework) installed on their computers which is a bad solution. So we will continue searching for how to use Microsoft Windows Media player of Real Player or any other global player to receive the data sent by IRAS-Streamer.
2. Multilanguage, it is not a big issue, we applied it to some forms but the time didn't help us to complete it.

Special Thanks

Finally we will thank our families for their patient and for their help. Also we thank the following persons:

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4- Eng Sufyan Samara.
5- Eng Othman Othman.
6- Mr. Darweesh Abu-Basha and Mr Is-haaq and all An-Najah Radio Staff.
7- Mr. Luca Crisis.

The end