The analysis and solutions in Game Transplantation on Mobile Phone Base on J2ME

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Abstract. This paper analyzes the problems encountered, Based on transplantation of different mobile phone and development. Through in-depth analysis, this article present the specific problems that we rely on a simple PC system in the software system architecture design, it is difficult to reuse the same model agencies in the next mobile platform system. Therefore, the idea of abandoning the inherent design patterns, by introducing the directive, the classification of project resources, as well as automatic construction of pre-project and release propose a new design concept, the development of of mobile phone game transplantation has a very important reference value.

Keywords: J2ME;mobilegame; MIDP; MIDP transplantation

1. Introduction

Although J2ME has the property of Java language since it born during the process of mobile phone game transplantation,the cross-platform is basically unable to play for the great differences exist in mobile devices configuration and software platform.From the point of hardware configuration, sophisticated mobile phone has a high resolution screen, 320 by 240 pixel ;The frequency of RISC is more than 100MHZ; and it has 1Mbyte Java Heap. However,the resolution of ULCH is low,within 100 by 100 pixel ; the ability of processor is limited.Heap memory is only about 200Kbyte[3].More mainstream mobile devices hardware performance is between the two extremes[4].

From the mobile device support extent in J2ME, at present, more than 100 mainstream mobile phones support J2ME is also varies greatly. In accordance with their equipment standardized, it can be classified into midp 1.0 and midp 2.0[5]; at the same time, it can be divided into Nokia, Sony Ericsson, Motorola and so on according to its implementation optional extended of the vendors. This article is mainly makes a conclusion of mainstream solution in the market and propose optimization through practice.

2. The Main Problem of Transplantation

The common problem lies in J2ME is transplant the developing game system in MIDP 2.0 into the MIDP 1.0 cellphone[1], there are some functions will be extinguished, they are mainly manifested in the followings :

- A series of MIDP 1.0 in MIDP 2.0 has no API needs to extra implement.,such as Game Canvas buffering,Sprite and so on[2].
- MIPD 1.0 do not support to play a sound itself, it need to get rid of the sound of game, or use the API on the host phone that can play a sound ,it needs to modify the code.
- The resolution of MIDP 1.0 cellphone is different,it might recomputer the coordinates of the game.
- The heap memory of mobile phone that support the MIDP1.0 is relative small, it probably lead to memory overflow of exception, it must be special optimization.

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- The processing capability of support MIDP 1.0 mobile phone is weaker than the one that support MIDP 2.0,it needs to optimize code[7].
- Because of the Jar limitation, it needs to reduced resources and the elimination of the code.

Moreover, while the mobile phone is transplanting with the MIDP version, there is still some defects in the following:

- Some parts of brand mobile phones have the particular defects. Such as Nokia 3320,it will become white screen when it play a sound.
- The hardware problems may not be able to support some functions of J2ME language, etc.

When it comes to the large scale of mobile transplantation, if there are 100 different kinds of mobile phones, and you will develop them according to the description above, that's impossible, for the cost of recourses is unreasonable, it's better to exploit the transplanting processor than continue it.

3. Existing Solutions

Those problems is mainly represents on the user interface during the game transplantation on mobile phone, mobile device support the change and reduction of extensible API，MIDP 1.0 and MIDP 2.0 [2]; and the logical of software development system framework will probably not change too much. If the stable subject logical in the application can be servered,and with different interface and expand API, the most problems occurred during the transplanting process could be solved.

3.1 Avoid differentiation

Most of difficulties are caused by the system incompatibilities among different machine types. Some are because of the limitation of hardware (such as the screen size), but the difference between MIDP 2.0 and MIDP 1.0 and the diversities among vendor optional extensions are avoidable[9].

1) Avoid using the new package and functions provided by MIDP 2.0 as soon as possible.

Although MIDP 2.0 is the development trend in the future, it must be sacrificed for the compatibilities. Avoid using the API in javax.microedition.lcdui.game.*, but with custom animation and scene module. Using setClip() and drawImage() replace drawRegin()；and use keyPressed() and keyReleased(),not use the getKeyStates() and so on[6].

2) Try to avoid using vendors expansion function.

Nokia produce mobile phones support their specific expansion UI, in addition, directGraphics provide the similar function of Graphics in MIDP, such as flip the image; at the same time, it provides the methods to getPixed() and drawPixed(). Majority of Nokia mobile phones support MIDP 2.0, so you can use the MIDP API as soon as possible. A part of mobile phones with system S40 can't use the API , it only can be use Nokia UI.

3) Uniform encapsulation for different implementations

Almost every firms have their own expansion of the sound play to implement the issues do not belong to MIDP 1.0 before publishing the standard of MIDP 2.0. Almost every firms have their own expansion of the sound play to implement the issues do not belong to MIDP 1.0. Even if MIDP 2.0 has its own multi-package MMAPI, but the early devices are still own a wide range of market. We can define an encapsulated Play, with uniform interface to different achievements on the basis of equipment.

3.2 Use MVC model

Separating the application logic from the image display to solve the problem of device difference, it is usually use the MVC model to solve those issues. The pattern can separate the display from the business logic well, but it is going to increase the number of documents.

As it shows in the figure1, View stands for the screen display. View ask the data from Controller by public interface and accept user input at the same time, the view do not deal with the input, but to enter the different methods of callback the controller according to the different inputs.

Controller provides the interface called by View and communicate with the model. It encapsulates the business process and hands the data has dealt by the model to View to display[8].

Model entity, it is mainly responsible for its object data processing, by the public ways, to realize the relative business itself by hiding privacy data. It protects the security of private data, there is no need for the other called modules to understand the specific implementation, by invoking the public method it can call each other, and simplifies the development process.
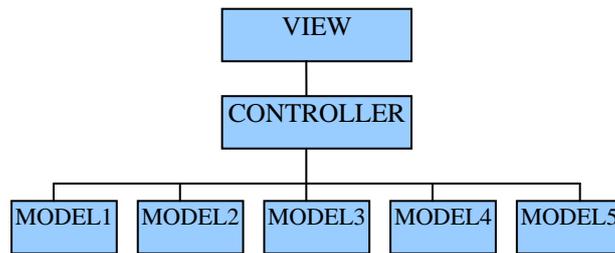

Figure1. MVC model

For instance,simplifying the MVC model in the snake game to M-V,this is an usual way in the J2ME, this method is based on the screen for organizational units and it is suitable for the RAD development. A screen and its control is abstract regarded as a VC class, and there is a private model objects in this class to represent the data elements are going to be used in the screen.Screen object do not hold any entity data, and these data are organized in the Model object. Because the object is very intuitive, the function of its controller is not clear, so it often called a Model-View. Model organize its screen data[8], View ask data it wants from Model, the operation can't be operated directly, you need to access it by consulting the interface in advance. If there is a complicated business logic, someone set it to the Model side, others set it on View, but it is usually put in the Model, the model play an role of controller at this time[7].

3.3 The shortcomings of the existing scheme
1) The amount of class is too much
Either the unified interfaces encapsulation or use the MVC model will make us compile more class to improve the robustness and readability of process. It will lead to the amount of class expand rapidly. Class called directly to each other and the various inspections will increase the cost of whole system and reduce the operating speed of games. Generally speaking, a suit file could be controlled about 5.
2) M-V module is difficult to divide clearly
The requirements of real-time on game development is higher than other applications, considering the performance of oriented object is limited, it bring the difficulties to the design model. The amounts of class can't be too much, some classes are put together so that they can't be tell clearly, and it is difficult to divide module finally.

4. Improving Solution

After the study and conclusio,there are three ways to solve the game transplantation on mobile phone.They can solve the module division,and accompany the code compile,rescouces package,description of file generation and the whole process of suit file.

4.1 Introduce preprocessing instructions
This method adopts a new module division, it no longer solo encapsulate module to a class, but divided a related field and method in the same class into a code segment, extracting it to the other files. To replace and combine the codes before compiling them and get the Java source code eventually. With different code segment you can get the all kinds of source code that meet the requirements. It is necessary for you to have some additional definitions on its specific property, including the key value, screen height and width to every equipment.

The compiler of this application can automatically create a preprocessing code after installing Mobility Pack 5.0.The reason why netBeans can compile more sets of applications according to preprocessing code is that it binding the project and configuration together. Here are the methods:

- In the*****.java edit window, right click to a class instancing source code line.

- Right click the row and select "preprocessing program block" >"create If/Else blocks".
- Add the code to the //＃if screen.
- When activities configuration meet the value of the preprocessing configuration, arranging the code marked with //#if preprocessing instructions. Otherwise, use the code surrounded by the //#else preprocessing instructions.

4.2 Project resources classification

To reduce the complication of code, different devices segment can have the same file name. And different devices use different resources, but they can have the same name. Those files can't exit in the same catalog, and to classify the resources and code in accordance with the equipment. This will help us have a better management on project, to share code and resources when multi-platforms are parallel developing.

4.3 Automatically construct and publish

While classified the resources and code reasonable, the difficulty of management has been reduced and sharing of code and resources are improving. But it is difficult for the developers to get the packed resources and preprocessing code during the debugging and publishing process. And it is easy to make mistakes, so it needs an automated processing to accomplish this task. Automatically construct will make all those functions come true.

- Based on the specified device name and version language, you can finish the searching and packing of resources, and the combination and preprocessing of source code. Here is a configuration file to record the property of each device, on the basis of these properties, it will automatically structure and find the corresponding catalogue, then copy all documents under this catalogue to the temp directory and then finish the package and preprocessing.
- Complete the code obfuscation and all class files pre-verification, publishing the issue eventually.
- Automatically creating Jad and Manifest etc description file.
- Automatically rename to the Jar file and Jad file, a complete file name should include the application name, device name, language and version number.It should be fine tuning during the automatically construct[10]. For example, on the debugging stage, the developers hope we can close this confusion process so that we can facilitate the work easily.

There are many ways and tools to realize the automatically construct. Ant、script language and batch processing could meet the requirements.

5. Conclusion

With the diversity of mobile phone platform. No matter from the piont view of the hardware architecture or the compatibility of software system, it will lead to the problems of transplantation on mobile phone. The software system architectural design that depends on the PC system is difficult to copy the same model architecture to the mobile phone platform architecture. Therefore, discarding the inherent design model and by introducing the preprocessing to categorize the project resources and the auto-build and publish for the project. It is a very important concept.

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