Mobile Game Design and Implementation Based on J2ME Technology

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Abstract

A mobile phone game named "Dragon Legend" is developed based on J2ME technology in this paper. Through designing the plot and requirement of game, the function process is introduced. Then the paper gives a detail introduction to design and implementation of the main class, main program, background class and key control based on J2ME. At last, the key technology and the implementation of the game is described.

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1. Introduction

As the name suggests, mobile phone game is the game which can play in the phone. With the technology developing, functions of mobile phone are more and more powerful. In 1997, the NOKIA set a game named “snake” in the phone--nokia5510, and this became a beginning of mobile phone game. Like games performed on other game platforms, snake was just a easy and fascinating game .Nokia set this classical game in the following phones, and made continuous improvement. With the time of steady development of games, other companies joined the competition. Siemens had put forward the concept of mobile phone game before Nokia. However, the concept is too far to accept by people, so it didn’t rise at that time. At the same time, another milestone -- WAP mobile games -- in the upcoming development was generated. As mobile phone hardware technology developed, the first color screen mobile phone -- Ericsson T68i launched in 2002. From then on, the era of mobile games from black and white went into a color-screen era. After the color revolution, games became various, such as racing games. While EA and other game manufacturers have begun to focus on mobile platform game development, mobile phone ushered in a new spring. Talking about Mobile games, we have to talk about the nokia N-Gage. N-Gage
has now become the most powerful gaming platform in mobile terminal. But N-Gage development is not smooth sailing that experienced the stagnation from 2005 to 2007. Until the last year, N-Gage 2.0 games platform once again showed Nokia's ambition in this area. N-Gage 2 platform is becoming more and more perfect. Activated by a growing number of products began its support Nokia games, mobile phone companies have begun to fetch their product, such as Motorola, Microsoft and Apple, which support the majority of game platform. With the multimedia handsets hardware performance's improvement, those games like Star War that run on PC can run in the mobile phone perfectly and also have a very stunning visual effects.[1-2]

The future of mobile game is still full of opportunity, especially when more and more iPhone games become popular. People began to pay more attention to mobile phone games and touch screen mobile phone game will be more and more popular. In addition, EA plans to launch later version Need for Speed and The Sims. Google has also been encouraging developers to Android platform mobile games. Games go through a relatively short but comparatively rich development. And for developers, handset manufacturers and operators will bring more profit, more fun for the players. The prospect of mobile game is wonderful.[3]

2. Development Technology

2.1 Mobile game development platform introduction

Now there are many mobile game platforms, such as J2ME, Brew, Symbian C++, Android, WindowsMobile, iphone platforms. Because only in specific high-end smart phones can display gorgeous effect, so the penetration is low and only represent to the future trend. Symbian C++ development of the game only runs on Symbian operating system, so the portability is poor. The J2ME platform with its excellent portability and strong performance advantage has held a high market share and become the most popular mobile game development platform.

2.2 J2ME technology introduction

J2ME (Java 2 Micro Edition) is an integral part of the Java 2, with J2SE, J2EE. According to Sun's definition, J2ME is a highly optimized Java runtime environment, mainly for consumer electronic devices such as cellular phones and video phones, digital set-top boxes, car navigation systems. In addition, J2ME borrowed part of J2SE class library, using less API, and its use of the JAVA J2ME virtual machine (JVM) should be much smaller than the J2SE's JVM.[4]

2.3 J2ME mobile game development features

a. It is an open platform. Although different devices have different API and hardware, it can be run on most mobile phones with minor modifications
b. Java language provides automatic memory garbage collection, object-oriented features supported, so greatly improve the efficiency of the program's development.

c. Java language security can completely avoid procedural errors to cause the system crash.
d. J2ME is supported by many vendors of industry standards. The industry's giants, including Nokia and Motorola, J2ME all provided good support.

3. Game design
3.1 Game description

Dragon Legend is a fusion of music legends game and adventure game elements in the mobile game. Players can base the background music of rhythm and screen prompts for the appropriate combination of keys to control game characters to move, attack, defense and other games action to complete the game in adventure.

The game takes place in an ancient village. People live a harmonious and peaceful life. All this thanks to the village shrine of a flame, it's brilliant bless of the villagers in the village for generations to survive. But suddenly one day, a Tarrasque with its men snatched the torch, and wounded the chiefs. Emirates tell people to defeat the Tarrasque and his men, fetch the Olympia torch, or the village would be drowned. At this time, a young, strong warrior volunteered to get the torch back to the village. Before his departure, Emirates hand dragon warriors a mysterious book, then warriors step on a dangerous journey.

3.2 Display module

This game display module is inherited GameCanvas class. All the display module of the picture all through a Graphics class (brush type) picture to the canvas class and then displayed on the screen. Main screen displays the main menu module, selected menu module, the game module. The logical structure is as shown in figure 1.

Main Menu Module: provides the main interface point to each page. UI design requirements which will be on the entire page is divided into two parts. The top is the name of the game's title picture. Another part is below the entrance page for the placement of other blocks. The user can select the entry through the navigation keys, confirm to enter.

Select the relevant menu modules: each time to continue the game or go to the next, it will enter the election off the page. This page is available, including game level entrance and the number of users has been adopted by the barriers, each off by one, and the entry will be open to the next level. Of course. You can choose to try again on an off.

Games module: this is the central module. UI design, top tips rhythm and key combination. According to the script prompts the bottom of the current plot or key operation is available. The middle section is made of the form of scrolls, bearing the main character walking, fighting, injuries, clearance and other scenes. In addition, to enter and exit the game module, scroll the screen will appear respectively open and close animation.

3.3 Design of interactive mode

Enter the game screen and the background music sounded, the players need to continuous input a key combination according to the rhythm of music. If the key combination to enter the correct game characters will move forward accordingly, attack, defense, or else players need to re-enter. Enter the game screen and the background music sounded, the players need to accent the rhythm of music appropriate for continuous input a key combination. If the key combination to enter the correct game characters will move forward accordingly, attack, defense, or else players need to re-enter. In addition, whatever players entered the timing and sequence of keys is correct, the game will appear in the appropriate prompt.

Move : ←→←→
Attack : →←←→
Defense : ↓→←←
4. GAME implementation

4.1 Midlet class preparation program entry

MIDlet is an inherited program entry, not only contains the required MIDlet pause (pauseApp), runs (startApp), destruction (destroyApp) three states, but also a variety of display module for the game to switch the menu module to the game module. For example, first of all, to display module class constructor an instance of passed Midlet class instance (such as menu = new Menu (this);), when you need to display the module switching. Just the display module in the current callback Midlet class newGame () method can switch the screen display module to the game module.

4.2 Game pictures and music processing

Since the program uses more pictures and music processing. in order to improve the reusability of code reusability and readability, we load the pictures and music and resources, methods of release packages encapsulate the tools category. Whenever dealing with pictures and music, just call the appropriate method of tools class method.

4.3 The judgement of key sequence

Because the game character’s actions are all depend on the right sequence of different keys to musical rhythm, so the order of key is very important.
By setting the three int array (int-array) to represent the move, attack and defense of key sequence
(\texttt{private int[] keyMove =\{4, 4, 4, 6\} // move the key sequence}). And then set an empty int array
(\texttt{private int[] myKey = new int[4]}) to hold the key sequence to detect the player. If four consecutive
correct rhythm, the storage of key players after the order of the array 4 times before the test set with the
representatives of advance, attack and defensive array of the same key sequence. The program will
immediately call the appropriate method to achieve progress in the game, attack and defense. If the
players in check in key sequence set before a meeting with representatives of advance, attack and defense
array of different key sequence, then the key sequence of the array of players set to null value will be null,
and button will be tested from beginning.

By setting the three int array to represent the move, attack and defense of key sequence.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Judgement chart of key sequence}
\end{figure}

In this process, there will be keyP and cKey. KeyP represents the key to this test is the appropriate
combination of keys corresponding to the first of several buttons that will detect the key stored in
myKey[keyP]. Then with keyMove [keyP] compared, if equal, by detecting if the failure range was
detected, and keyP and cKey are set to 0, myKey = null. cKey as 1,2,3 represent the attack, attack and
defense of three key combination. cKey = 0 that there was no corresponding key combination. Judgement
in the game through a combination of keys the first button (the keyP = 0 pm) to determine the cKey to
that key combination.

\subsection{4.4 Collision detection}

In the course of the game, through characters, monsters, fire, precious pictures or Sprite various
collision between classes to achieve different game effects, such as characters and monsters lose blood,
injured, clearance. The links between different layers is achieved through the collision.

In this game, due to the characters and monsters and other images set to the Sprite, so you can use
these in three ways to achieve the game crash all the collision. One collidesWith (Sprite s, boolean
pixelLevel) method is used to check the collision between the Sprite class, method collidesWith (Image
image, int x, int y, boolean pixelLevel) used to check the Sprite class and the Image class collisions between, if collision is detected, it returns true, otherwise, it returns false. Then with the return value to determine whether the suspension with the appropriate methods to achieve specific functions, such as characters lose blood, monsters back and so on.

4.5 Scroll animation processing

Scroll animation processing core is named the game to a white canvas blank Image class to the bottom of the game background separation. The Image class with the scroll movement and change its size, so that painting above the game screen changes this way, the scroll switch effect.

To scroll to open animation code, for example, through the Graphics gthis = white.getGraphics () to define the screen to the Image class, and then call gthis the drawImage () method in the game image to the white paint, then painted in the white underlying background to the game, each one painted white would change its width equal to the width of the screen up with. As the reel is rolling from the middle to both sides, so the white should always painted in the middle of the screen, but also to show the game screen is always in the middle of the screen to ensure gthis picture painted by the relative position of the screen and the white with the screen The relative position of the line.

4.6 Garbage collection

Although J2ME provides automatic garbage collection mechanism (automatic garbage collection), because of the hardware limitations of mobile phones as well as garbage collection mechanism on a matter of time, resources lack of effective release to take up valuable memory space, so manually in the development process the resources that will not shut down and its value is set to null, and call in the right place System.gc () method of garbage collection.

5. CONCLUSION

This article explains the J2ME mobile phone game development technology, and innovation through a dragon legend named mobile game design ideas and the principal of the encoding process shown in J2ME game development in the specific application methods and rich functionality. Currently, J2ME MIDP 2.0 game developers provide packages to help application developers quickly to develop highly efficient mobile games.

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