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Comprehensive Analysis with KVM Techniques and Implementation of Object Pool Based on J2ME RMS

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Abstract

J2ME services play an important role in the field of Communication industry. In this paper, we discuss and analyze the consumptive behaviour based on object pool with RMS capabilities. We discuss and analyze different aspects of RMS mining techniques and their behaviour in mobile devices. We also analyze the better method or rule of implementing services which is more suitable for mobile devices. The method this paper mentioned has benefit to analyze large numbers of data in consumptive behaviours and provides some instructions to improve better marketing in concerned fields. In this paper we use J2ME components like CLDC (Connected Limited Device Configuration) and MIDP (Mobile Information Device Profile) with data mining services (DMS) that provide local storage, a user interface, and networking capabilities that runs on mobile computing devices. We also discuss the need of Object Pool in mobile devices to enhance the capability of mobile devices. Object pool model based on RMS is proposed. Aimed to solve the Memory peak problem in J2ME, on the basis of object pool design pattern, an object pool model used RMS is designed and implemented.

Keywords

J2ME, RMS, MIDP, CLDC

1. Introduction

The innovations in computer science have made it possible to acquire and store enormous amounts of data digitally in databases, currently giga or terabytes in a single database and even more in the future. Many fields and systems of human activity have become increasingly dependent on collected, stored, and processed information. However, the abundance of the collected data makes it laborious to find essential information in it for a specific purpose. In the late 1980's, the disciplines of knowledge discovery and data mining emerged to help survey the information content of data. It is also use in mobile devices with the use of MIDLET and CLDC component of J2ME.

International Mobile Telecommunications-2000 (IMT-2000), better known as 3G or 3rd Generation, is a family of standards for wireless communications defined by the International Telecommunication Union, which includes GSM EDGE, UMTS, and CDMA2000 as well as DECT and WiMAX. Services include wide-area wireless voice telephone, video calls, and wireless data, all in a mobile environment. Compared to 2G and 2.5G services, 3G allows simultaneous use of speech and data services and higher data rates (up to 14.4 Mbit/s on the downlink and 5.8 Mbit/s on the uplink with HSPA+). Thus, 3G networks enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency.

In J2ME, Object initialization Contains a number of time-consuming operation (For example, read out some data from a server which is 20,000 km away); mobile devices need to access some objects frequently to instantiated the object which make equipment focus on create these objects rather than the use of these objects.While Bluetooth hardware has advanced, there has been no standardized way to develop Bluetooth applications - until JSR 82 came into play. It is the first open, non-proprietary standard for developing Bluetooth applications using the Java programming language. It hides the complexity of the Bluetooth protocol stack behind a set of Java APIs that allow you to focus on application development rather than the low-level details of Bluetooth. JSR 82 is based on version 1.1 of the Bluetooth Specification.

The Java APIs for Bluetooth target devices with the following characteristics:

- 512K minimum of total memory available (ROM and RAM) (application memory requirements are additional)
- Bluetooth wireless network connection
- Compliant implementation of the J2ME Connected Limited Device Configuration (CLDC).

The underlying Bluetooth system upon which the Java APIs will be built must also meet certain requirements:

- The underlying system must be "qualified," in accordance with the Bluetooth Qualification Program, for at least the Generic Access Profile, Service Discovery Application Profile, and Serial Port Profile.

- The system must support three communication layers or protocols as defined in the 1.1 Bluetooth Specification and the implementation of this API must have access to them: Service Discovery Protocol (SDP), Radio Frequency Communications Protocol (RFCOMM), and Logical Link Control and Adaptation Protocol (L2CAP).
- The system must provide a Bluetooth Control Centre (BCC), a control panel much like the application that allows a user or OEM to define specific values for certain configuration parameters in a stack.

OBEX support can be provided in the underlying Bluetooth system or by the implementation of the API. The OBEX protocol provides support for object exchanges, and forms the basis for Bluetooth profiles such as the Synchronization Profile and the File Transfer Profile.

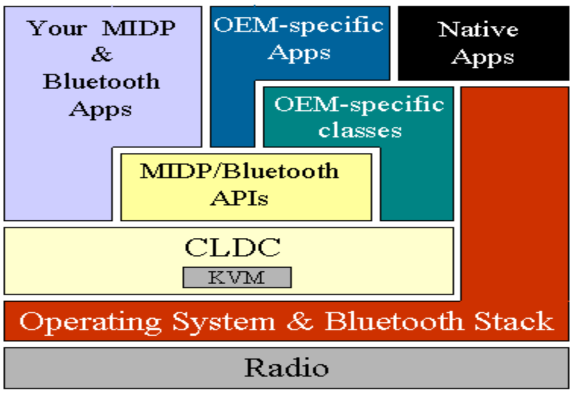

Fig1 J2ME Architecture

The remaining of this paper is organized as follows. We discuss CLDC and MIDP in Section 2. In Section 3 we discuss about RMS, evolution and need of RMS in section 4.In section 5 we discuss about recent scenario, conclusion and future directions are given in Section 6. Finally references are given.

2. CLDC and MIDP

Sun Microsystems defines J2ME as "a highly optimized Java run-time environment targeting a wide range of consumer products, including pagers, cellular phones, screen-phones, digital set-top boxes and car navigation systems."Announced in June 1999 at the JavaOne Developer Conference, J2ME brings the cross-platform functionality of the Java language to smaller devices, allowing mobile wireless devices to share applications. With J2ME, Sun has adapted the Java platform for consumer products that incorporate or are based on small computing devices.

J2ME uses configurations and profiles to customize the Java Runtime Environment (JRE).As a complete JRE, J2ME is comprised of a configuration, which determines the JVM used, and a profile, which defines the application by adding domain-specific classes. The configuration defines the basic run-time environment as a set of core classes and a specific JVM that run on specific types of devices. The profile defines the application; specifically, it adds domain-specific classes to the J2ME configuration to define certain uses for devices. The following graphic depicts the relationship between the different virtual machines, configurations, and profiles. It also draws a parallel with the J2SE API and its Java virtual machine. While the J2SE virtual machine is generally referred to as a JVM, the J2ME virtual machines, KVM and CVM, are subsets of JVM. Both KVM and CVM can be thought of as a kind of Java virtual machine.

The configuration defines the basic run-time environment as a set of core classes and a specific JVM that run on specific types of devices. Currently, two configurations exist for J2ME, though others may be defined in the future:

- Connected Limited Device Configuration (CLDC) is used specifically with the KVM for 16-bit or 32-bit devices with limited amounts of memory. This is the configuration (and the virtual machine) used for developing small J2ME applications. Its size limitations make CLDC more interesting and challenging (from a development point of view) than CDC. CLDC is also the configuration that we will use for developing our drawing tool application.

- Connected Device Configuration (CDC) is used with the C virtual machine (CVM) and is used for 32-bit architectures requiring more than 2 MB of memory. An example of such a device is a Net TV box.

CLDC requirements
CLDC defines the following requirements:
* Full Java language support (except for floating pointer support, finalization, and error handling)
* Full JVM support
* Security for CLDC
* Limited internationalization support
* Inherited classes -- all classes not specific to CLDC must be subsets of J2SE 1.3.

Profiles are built on top of configurations. Because profiles are specific to the size of the device (amount of memory) on which an application runs, certain profiles are associated with certain configurations. A skeleton profile upon which you can create your own profile, the Foundation Profile, is available for CDC. However, for this tutorial and this section, we will focus only on the KJava and MIDP profiles built on top of CLDC. MIDP is geared toward mobile devices such as cellular phones and pagers. The MIDP, like KJava, is built upon CLDC and provides a standard run-time environment that allows new applications and services to be deployed dynamically on end-user devices.

3. RMS

The Mobile Information Device Profile provides persistent storage of data through a simple a simple record-oriented database called the Record management system (RMS).Data is stored over multiple sessions in non-volatile memory, However in Palm OS devices the data is stored in volatile memory. In case of volatile memory the data will be lost if the battery of the device is removed for a couple of minutes.

J2ME Record Management System (RMS) Architecture

RMS manages persistent data through Record Stores. Each record store has Record Header and a collection of Records. The below figure gives an idea of the architecture of the RMS database

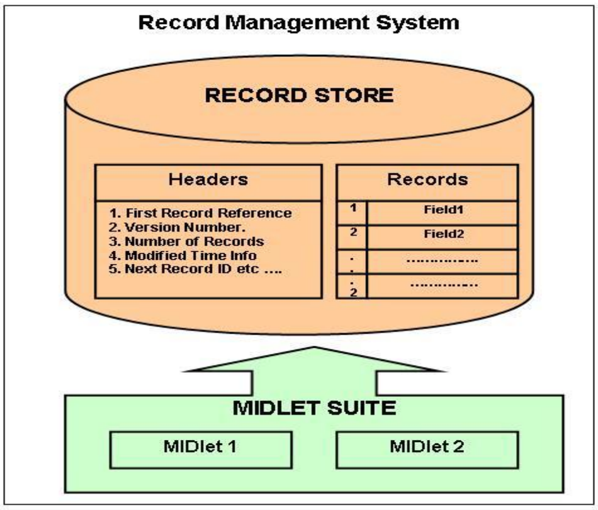

Fig 2 RMS Architecture

Records in RMS are completely different from the records in the normal database system. Do not compare MIDP RMS with your normal database; RMS has no primary keys, foreign keys, stored procedures etc. Each record consists of a record ID and a single binary data field. All data should be converted to byte array before being added to the record store. Multiple fields are not allowed in a single record.

Compatible algorithm should be written by the programmer like storing multiple fields into a single record. If your record has First Name, Last Name as fields then you can store these fields into a single record by making them coma or pipe separated and then stores them to a Record Store. While retrieving the data the record should be decoded for further use.

Record ID's are unique identifiers that are added along with the inserted data by the RMS system. Record ID is 1 for the first record and gets incremented by one on every addition of a new record. If any record is deleted from the Record Store the Record ID's will not be reset in sequential order. The below figure shows diagrammatically the effect of deletion of record with record ID 3 from the record store.

4. Evolution and Need of RMS

In 2001, Xu kegang et al. [1] proposed a platform called PMMAP, a Java-based mobile agent's platform that is oriented for program mining. It is a kind of computing paradigm that makes use of several task-specific software agents to analyze user's requests for computing, search and retrieve candidates from online component repositories in term of the request, compose and reassemble them to form a whole program that performs the expected computing. It achieves computing on demand at application level on the Internet. It will change the distribution of software and make upgrade on the line possible. There are currently almost 100 million 3G wireless subscribers worldwide. Japan stayed in the lead with over 50% of its subscribers using 3G phones and The US, with over 200 million mobile subscribers, crossed the 10% mark for 3G penetration for the first time. As 3G adoption accelerates, handset manufacturing, 3G carriers, semiconductor OEM's, infrastructure equipment makers, and 3G application providers stand to gain. Wireless Internet Service Providers, carriers without the wherewithal or financial resources to upgrade their networks, and companies that provide services which are standard under 3G, will be in a position to lose.

In 2002, Abdelkader Hameurlain et al. [2] proposed the use of mobile query optimizations based on agent-technology for distributed data warehouse and OLAP (On-Line Analytical Processing) applications to adapt the concurrent query execution dynamically to the computing resource.

In 2004, H.Zhuge et.al [3] Proposed that Knowledge Grid is a sustainable human machine interconnection environment that enables people or agents to effectively generate, capture, publish, share, manage and promote knowledge, to process any type of resource through machines, and to transform resources from one form to another.

M-Commerce is one new E-Commerce model. Mobile commerce refers to the use of mobile handheld devices to conduct any electronic transaction or information interaction that leads to transfer of value in exchange for information, services or goods over wireless networks [4]. With the help of wireless technology, people can take commerce activities at anytime and anywhere. While this has dramatically transformed our society in the way we communicate, create, retrieve and share information, collaborate and socialize each other, the application of these technologies to certain sectors of society is still in its infancy [5], [6].

M-Learning bases the success of current and future learning applications on the capability of such applications to incorporate mobility to support the learning processes. For this reason, this issue has already attracted the attention of researchers, pedagogues and developers of applications from e-learning [7], [8], [9].

The situated learning paradigm [10] emphasizes the idea of cognitive apprenticeship where teachers (the experts) work alongside students (the apprentices) to create situations where the students can begin to work on problems even before they fully understand them.

5. Recent Scenario

In 2009 Wu Yueliang et.al [11] proposed a concept for Web services which is used to deal with the interaction between the server end and the customer end and supports the issue of backstage service end program**.**

In 2009, Huimin Wang, Guihua Nie and Kui Fu [12] proposed that Knowledge acquisition from distributed data resources to support decision-making is receiving an increasing attention. The paper proposes distributed knowledge acquisition chitecture and puts forward any new solve algorithms for knowledge acquisition from large-scale distributed and heterogeneous data resources. Semantic web technology is used to explicitly define data semantics.

In 2010, Ashutosh Dubey et al. [13] proposed a novel data mining algorithm named J2ME-based Mobile Progressive Pattern Mine (J2MPP-Mine) for effective mobile computing. It is used for incremental mining in open framework.

In 2010, Ashutosh Dubey et al. [14] proposed discuss and analyze the consumptive behaviours based on data mining technology. They discuss and analyze different aspects of data mining techniques and their behaviour in mobile devices. They also analyze the better method or rule of data mining services which is more suitable for mobile devices.

In 2010,Xu et al.[15] proposed about the use of The Java 2 Platform, Micro Edition (J2ME) to develop mobile applications. For 3G networks which introduces the structure of our J2ME computer vision library and describes the implementation of algorithms in our library. A type of J2ME-based mobile e-commerce system design program is presented; the program has the advantages such as simple realization, strong manoeuvrability.

In 2010, Zhao Liang et al.[16] proposed about An object pool model based on RMS is proposed. Aimed to solve the Memory peak problem in J2ME, on the basis of object pool design pattern, an object pool model used RMS is designed and implemented.

6. Conclusion and Future Directions

In this paper, we discuss pool technology in J2ME.The test results show that RMS used for persistent storage in J2ME can also be used for virtual memory. Through pooling we do reduce memory usage and achieve the purpose of Optimization. What cannot be ignored is pool technology itself must pay the price.

Test results in simulator can't represent the real phone environment so the model proposed in this paper has its scope range. This range is caused by pool technology itself and the real machine hardware environment. In "Performance Myths Exposed" talk at JavaOne 2003, Dr. Cliff Click offered object pooling is a performance loss for all but the most heavyweight objects on modern JVMs.

Along with the rapid development of information technology, executing advanced technologies through mobile handset is the prime direction of development.

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