

# Java Ring

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**Abstract:** Java ring is a finger ring in which a small microprocessor was contained with some built-in capabilities for the user, it is a sort of smart card that is easily wearable on the finger. Sun microsystem's java ring was introduced at their java one conference in 1998 and it contained an inexpensive microprocessor built in a stainless steel ibutton that was running a java virtual machine (jvm) and was preloaded with applets (little applications programs). It was not an ordinary ring that contains the gemstones instead of gem stones it contained the inexpensive microprocessor. It was built by Dallas semiconductor.

**Keywords:** Rapid zeroization, Personalization, Wearable, Cryptographic iButton, Java virtual machine, Applets, etc.

## 1. INTRODUCTION

The java ring was an extremely secure java-powered electronic token that has a continuously running, the unalterable real time clock and rugged packaging that was suitable for many applications. The most precious stone or we can say the jewel of the java ring is the java i-button that is a one million transistor, with a single chip trusted micro computer that has a powerful java virtual machine (JVM) that is housed in a rugged and secure stainless steel case. That was designed to be a fully compatible with the java card 2.0 standard. The packaged module has only a single electrical contact and a ground return, confirming to the specifications of the Dallas semiconductor I-Wire bus. In this the Lithium-backed non-volatile SRAM the static random access memory offers the high read and write speed and an unparalleled tamper resistance. Through near-instances clearing of all memory when tampering is detected, a feature known as rapid zeroization. The data integrity and the clock function are maintained for more than 10 years. The 16 millimeter diameter stainless steel enclosure accommodates larger chip sizes needed for up to 128 kilobytes of high speed non-volatile static ram. The small and extremely rugged packaging of the module allows it to attach to the accessory of your choice to match individual lifestyles, such as a key, job, wallet, watch, necklace, bracelet or finger ring.



Figure 1

## II. BACKGROUND

In the summer of 1989, Dallas semiconductor corporation produced the first stainless steel encapsulated memory devices utilizing the Dallas semiconductor i-wire communication protocol. By 1990, the protocol had been refined and employed in a variety of self contained memory devices. Originally called "touch memory" device they were later renamed "i-buttons" packaged like batteries, i-buttons have only a single active electrical contact on the top surface, with the stainless steel shell serving as ground.

Data can be read from or written to the memory serially through a simple and inexpensive RS232C serial port adapter, which also supplies the power required to perform the I/O. The i-button memory can be read or written with a momentary contact to the "blue dot" receptor provided by the adapter. When not connected to the serial port adapted memory data is maintained in non-volatile random access memory (NVRAM) by a lifetime lithium energy supply that will maintain the memory content for at least 10 years. Unlike electrically erasable programmable read only memory (EEPROM), the NVRAM i-button memory can be erased and rewritten as often as necessary without wearing out. It can also be erased or rewritten at the high speeds typical of complementary metal oxide (CMOS) memory, without requiring time-consuming programming of EEPROM.



Figure 2

## III. JAVA VIRTUAL MACHINE

The java virtual machine is the piece of the software that recognizes the java language and translates the byte code. It supports java card 2.0 specification. It allows the java ring to navigate through java operating environment. It provides automatic garbage collection for efficient reuse of memory space.

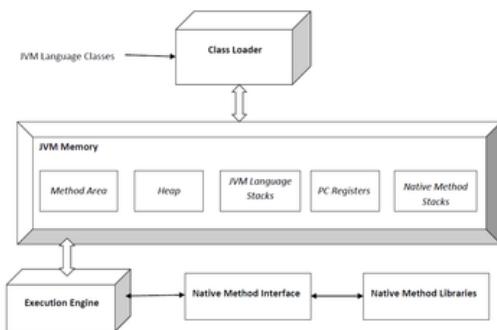


Figure 3

#### IV. iBUTTON

The i-button device is a micro chip similar to those used in a smart card but housed in a round stainless steel button of 17.35mm. The ibutton is a computer chip that is enclosed in a 16mm thick stainless steel can. Because of this unique and durable container, up-to-date information can travel with a person or object anywhere they go. It is designed to be fully compatible with the java card 2.0 standard. It is small and portable enough to attach to a key fob, ring, watch, or other personal items.

Types of i-button:-

- Memory iButton.
- Java powered cryptographic iButton.
- Thermochron iButton.



Figure 4

#### V. JAVA CONNECTION

The java connection is with the experience designing the E-Commerce operating system and VM for the Crypto iButton hardware platform. With a java iButton, a vast number of existing java programmers could easily learn to write applets that could be compiled with the standard tools available from sun Microsystems, loaded into the java iButton, and run on demand to support a wide variety of financial applications. The java card 2.0 specifications provided the opportunity to implement a useful version of the JVM and runtime environment with the limited resources available to a small process.

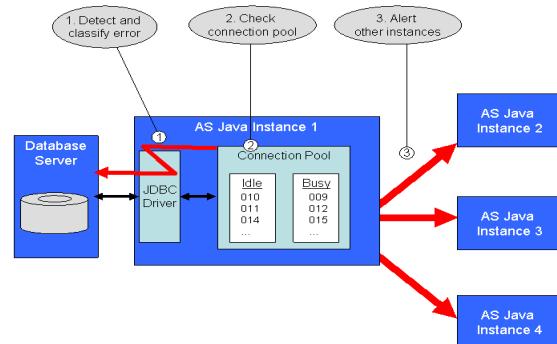


Figure 5

#### VI. APPLICATIONS/USES OF JAVA RING

Access control to buildings and equipments. It secure the network login using challenge/response authentication. Storage vault for user names and passwords. It is the user profile for rapid internet form-filling. It provides the digital signature for the E-Commerce. United states postal service postal security device for PC postage downloadable over the internet. Digital photo ID and fingerprint biometrics.



Figure 6

#### VII. INSIGHT OF JAVA RING

The today's world is the hunt for the new technology, and has contributed miracles to the world of science, the ever ending stream. The one such contribution is the JAVA RING the finger ring that contains a small microprocessor with a built in capabilities for the user, a sort of smart card that is wearable on the finger. Well it's something new to the world. Since it has not been very popular these days, it's really a new opening for sure.

Introducing more of it we can say that, it contained an inexpensive microprocessor in a stainless steel iButton, this particular is running on a java virtual machine and it is preloaded with applets.



Figure 7

### VIII. OPERATING SYSTEM IN JAVA RING

A special operating system was designed and stored in the ROM of crypto iButton to support cryptography and general purpose financial transaction- such as those required by postal service program. While not a java virtual machine the E-Commerce firmware designed for the application have several points of similarity with java, including an object oriented design and a byte code interpreter to interpret and execute the Dallas semiconductor custom designed E-Commerce script language.

The compiler was also written to compile the high level language representation of script language to a byte code form that could be interpreted by the E-Commerce VM.

Although the E-Commerce firmware was intended primarily through the USPS application, the firmware supports a variety of general electronic commerce models that are suitable for many different applications.

### IX. SECURITY

National institute of Standards and technology (NIST) and the Canadian security establishment (CSE) have validated the DS1954 cryptographic iButton as meeting federal information processing publications (FIPS 140-I).

The crypto iButton includes the highest level of physical security ever validated by the FIPS 140-1 program and it does this in an extremely small and durable package. There is no other hardware token like this meeting government and federal requirements and providing rich functionality at a fraction of the cost of similar devices.

The crypto iButton provides hardware cryptographic services such as long term safe storage of private keys , a high speed math accelerater for 1024- bit public key cryptography and secure message digest.



Figure 7

### X. ADVANTAGES

The java ring is a very easy and convenient way for the users. The users are more sure than using the passwords as since the passwords are short or they can be guessed. The java ring provides the authentication to users which is crucial for the many applications. As it is very easier for administrator to maintain the security infrastructure and it will provide the real memory, more power and a capacity for dynamic programming. The java ring was used widely all around the world for the several applications such as the access control, asset management, e-cash and for many other purpose.

**ASSET MANAGEMENT:** The java ring provides us the very simple and a secure way of identifying any person or the asset. It will serve us an electronic serial number that can never be duplicated. With an memory up to 32k bytes the java ring can also give the asset their own personalized database. As each asset will have the ability to store the unique information permanently fixed to the asset. This makes the java ring perfect for the various assets management and data collection function such as equipment maintainance and record and inventory management. By connecting our java ring to a ring receptor to a car and the car knows based on your profile what you are allowed to do.

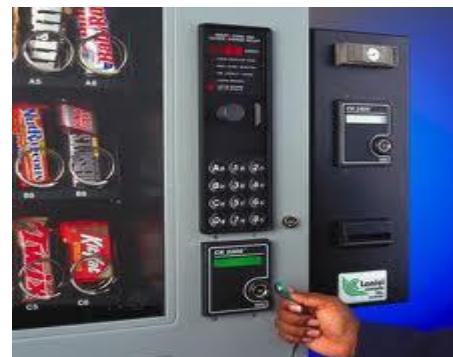


Figure 8

**Access Control:** The java ring becomes a personalized key to protected assets and information. By touching the correct key to an iButton reader, the desired event such as opening a lock is enabled. Java ring are perfect for various access control functions like access to buildings, computers, vehicles and equipments.



Figure 9

**E-Cash:** The Java ring can be a personalized token and acts like a small change for one or multiple applications. It

enables to complete the transactions, like dispensing a candy bar or metering a prepaid volume of water. By using the java ring it eliminate to carry the small amounts of cash and it can service multiple, independent applications.

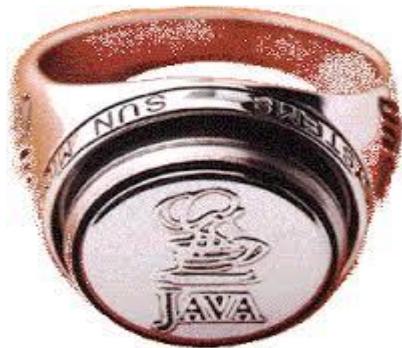


Figure 10

## XI. DISADVANTAGES

Although the java ring can be the most secure storage medium for many industries the cost of implementing the system could be very high. Even though the iButton can be purchased for cheaper price in order to function it needs a receiver such as blue dot receptor which could be very expensive. Also it needs a

high level tools and method in order to program applications effectively, reliably and securely.

As such a java ring based system does not automatically allow user mobility. The problems with the java ring that many organization does not even know the existence of java ring. User mobility is only possible if every machine that the user accesses has a iButton.

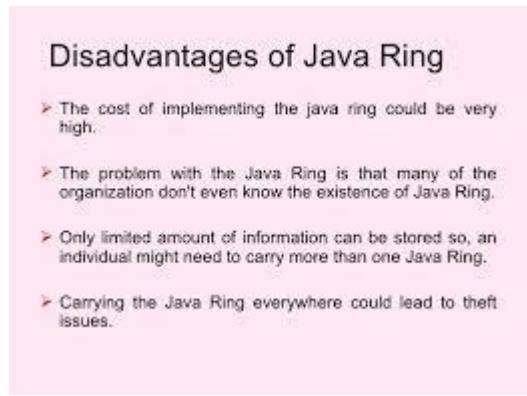


Figure 11

## XII. CONCLUSION

Java has significant advantages not only as a commercial language but also as a teaching language. It allows to learn the object oriented programming to the students without exposing them to the complexity of C++. Java might well be a language that most computer science departments could agree to use as an introductory language. This paper address one of the areas where more power is needed. It extends java with a mechanism for parametric polymorphism which allows the definition and implementation of generic abstractions.

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