The Java Virtual Shell and Kernel

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Abstract: *Our aim is to develop a shell and kernel in Java that will be able to run on most of the available operating systems that supports Java Runtime Environment. The shell and kernel would be designed in such a way that the beneath platform (operating system and hardware) should not impact on the syntax and output. Also there should be a unique set of commands that we are going to develop, which will be same throughout various Operating systems where we will be using this shell. The other aim is to develop an advanced set of commands that will prove very useful for the users when using this shell. The advance commands will be file utilities such as file splitter, file/folder locker, file/folder zipper, an inbuilt rich text editor, ftp client etc. This all utilities are general and users all time need them, we are going to provide them in the shell itself so that only installing the shell will avail the user with all of the utilities mentioned.*

Keywords: *Shell, Kernel, JVM, Feasibility*

1. INTRODUCTION

In computing, a shell is a piece of software that provides an interface for users. Typically, the term refers to an operating system shell [2] which provides access to the services of a kernel. However, the term is also applied very loosely to applications and may include any software that is "built around" a particular component, such as web browsers and email clients that are "shells" for HTML rendering engines. The name 'shell' originates from shells being an outer layer of interface between the user and the innards of the operating system (the kernel) [3].
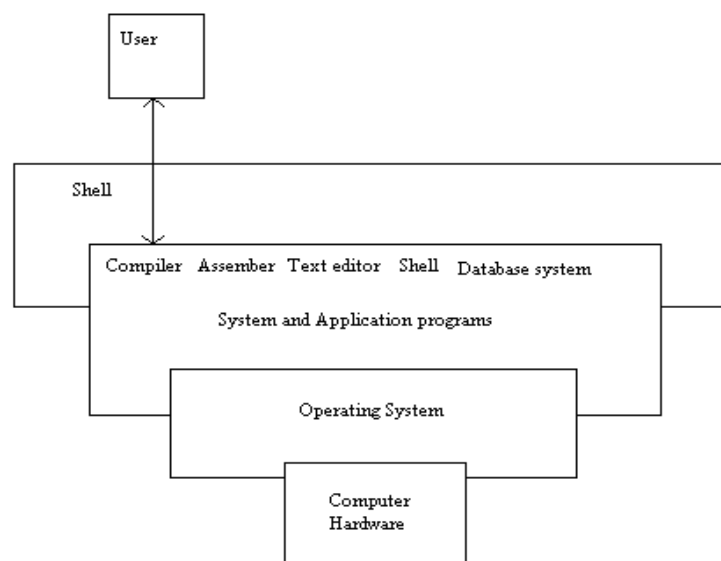

Fig1.*Operating System*

Operating system shells generally fall into one of two categories: command line and graphical. Command line shells provide a command line interface (CLI) to the operating system, while graphical shells provide a graphical user interface (GUI). In either category the primary purpose of the shell is

to invoke or "launch" another program; however, shells frequently have additional capabilities such as viewing the contents of directories.

The kernel is the essential center of a computer operating system, the core that provides basic services for all other parts of the operating system. A synonym is nucleus. A kernel can be contrasted with a shell, the outermost part of an operating system that interacts with user commands.

2. SCOPE

1. To develop a graphical user interface of the user to enter the commands and an area where the user will get the output of the command issued.

2. To develop a shell program this will receive the command issued by the users to the user interface and validate them against the set of the commands and the syntax of the commands.

3. After the validation, the shell will issue the commands along with the parameter required to gather the output.

4. To develop a kernel program this will take the input (commands and parameters) from the shell and execute the operation on the operating system resources.

5. It's out of scope for the system/project to develop a full fledge kernel which will be able to boot and manage the hardware resources, we are looking at the project/program more as a virtual shell and kernel of the operating system.

6. We are not going to develop any system calls that will try to manage memory or processes. We are here not trying to access any drivers such as hardware drivers or system drivers.
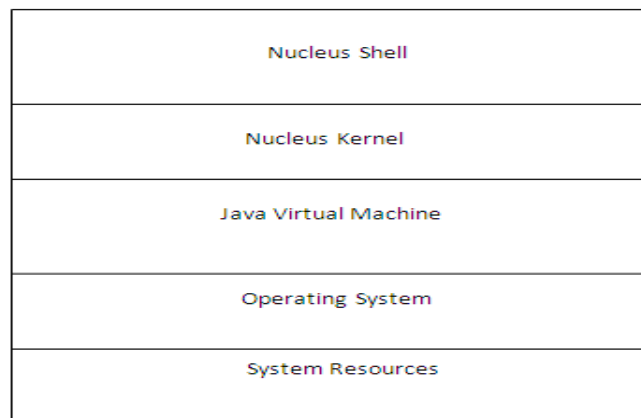
3. NUCLEUS

Figure2. *Nucleus Architecture*

Nucleus is a virtual machine implementation of a kernel and shell written in Java. Though we are calling Nucleus as a virtual operating system, only the shell and kernel are implemented. The main advantage of writing Nucleus in java is that it gives the power to so as to run the implementation on various platforms such as windows, UNIX, Linux or Solaris.

Nucleus is written in Java, unlike other operating systems like windows or Linux. This makes Nucleus portable, secure, thread-safe, robust and object oriented. In short all the features and advantages present in Java are present in Nucleus.

Nucleus has a layered structure, the first and the upper most layers is the shell. The shell has a set of inbuilt user commands that deals with File-System structure, File editing and deleting commands, memory related commands, etc.

Some of the commands that we will be implementing as File-System structure are cd (change directory), md(make empty directory) and rd(remove empty directory). Commands related to Files will be edit (Editor), del(will delete a file), copy, move etc. Another set of commands will include System commands such as date, time, prompt and help.

Below is the complete architecture of the Nucleus operating system.

4. ADVANTAGES & LIMITATIONS

4.1. Advantages

1. Used on all java supported operating systems.
2. Has advanced commands.
3. Since Java is used, garbage collector takes care of memory management.
4. Platform Independent:-The platform does not have any impact on the syntax   and output.

4.2. Limitations

1. Scope of the project is limited to a virtual shell and kernel.
2. Cannot program system to be able to boot.

5. APPLICATIONS

1. Can replace many shells.
2. Can be used as a learning utility.
3. Can be used for cross platform support.
4. Can be used in environments where 'Virus Free Environment' is a requirement.

6. CONCLUSION

Nucleus is a virtual machine implementation of a kernel and shell written in Java. Though we are calling Nucleus as a virtual operating system, only the shell and kernel are implemented. The main advantage of writing Nucleus in java is that it gives the power to so as to run the implementation on various platforms such as windows, UNIX, Linux or Solaris. Nucleus is written in Java, unlike other operating systems like windows or Linux. This makes Nucleus portable, secure, thread-safe, robust and object oriented. In short all the features and advantages present in Java are present in Nucleus.

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