

Shell Programming in Healthcare Sector

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Abstract

Command Line Interface (CLI) is still the keystone of automation and system administration, regardless of how Graphical User Interfaces have taken up the dominant position for various similar tasks. The shell programming assists in improving the efficiency of work-flow, managing the complex and sophisticated system configuration and automate repetitive tasks by enabling the users to write scripts and sequences of commands that are stored in files. The Bourne Shell language was mainly utilized to automate system administration task. Though Bourne shell was known for its speed and accuracy, however it had many lacunas such as lack of certain features of interactive use like history, job control etc. Shell scripting languages like Bourne shells, C shell and Korn shell paved way for automation of common tasks and enhance the functionality of Common Line. This study explores the various arena of Shell Programming in Healthcare Sector.

Keywords: Shell programming, accuracy, health, command line interface (CLI), C shell and Korn shell

INTRODUCTION

The Command Line Interface (CLI) has emerged as one of the most prevalent instruments to interact with computer systems. Prior to the advent of Shell programming language, the early operating systems were heavily reliant on the text-based interface that allows the user to command directly to the kernel [1]. However, Command Line Interface (CLI) is still the keystone of automation and system administration, regardless of how Graphical User Interfaces have taken up the dominant position for various similar tasks. The shell programming assists in improving the efficiency of work-flow, managing the complex and sophisticated system configuration and automate repetitive tasks by enabling the users to write scripts and sequences of commands that are stored in files. In a nutshell, shell programming is a technique to craft scripts for CLI (Command Line Interface) to automate any task which is an essential skill for system administrators and users [2]. An unusual application known as a shell serves as a user interface for operating system functions. It converts user commands that are comprehensible by humans into instructions that the kernel can understand. It performs commands from scripts or input devices like keyboards as a command language translator. When a user opens a terminal or logs in, the shell is enabled [3].

HISTORICAL SIGNIFICANCE

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In 1979, the first UNIX shell, “Bourne Shell” (named after its creator), was introduced by Stephen Bourne. The Bourne Shell language was mainly utilized to automate system administration task [4]. Though Bourne shell was known for its speed and accuracy, however it had many lacunas such as lack of certain features of interactive use like history, job control etc. Shell scripting languages like Bourne shells, C shell and Korn shell paved way for automation of common tasks and enhance the functionality of Common Line [5]. The main reason for such exponential growth of UNIX was due to the factors such as Simplicity, Flexibility and Portability. The shell programming was easy to

understand as compared to other languages. Scripting languages allowed for wide and versatile range of commands allowing for complex operations and due to its standardized nature, these shells were portable across various UNIX systems [6].

CORE CONCEPTS OF SHELL PROGRAMMING

A graphical user interface (GUI) or a command-line interface (CLI) can be used in a shell software. It is crucial to realize that a shell may be either a CLI or a GUI and that it is not the same as a terminal, despite some sites suggesting that only CLI programs are considered shells or that people may mistake command terminals for shells themselves [7]. A terminal is a window or environment where a command prompt may be used to interact with a shell. For example, the Windows default terminal is named Command Prompt, whereas the default terminal on macOS is called Terminal. Actually, neither of these is a shell [8].

- *Shells*: A shell is a program which provides for user-interface for the purpose of interacting with the operating system. Popular shells include bash (Bourne Again Shell), zsh (Z shell), and fish (Friendly Interactive Shell). Each shell offers its own syntax and features.
- *Variables*: Variables store data that can be used within the script. They can hold text, numbers, or other information.
- *Control Flow*: Control flow statements dictate the execution order of commands in the script. Common control flow structures include loops (for, while) and conditional statements (if, else).
- *Functions*: Functions are reusable blocks of code that perform a specific task. They can take arguments and return values.
- *Input/Output (I/O)*: Scripts can interact with the user through standard input (stdin), standard output (stdout), and standard error (stderr). Files can be manipulated using commands like cat, cp, and mv [9].

ADVANTAGES OF SHELL PROGRAMMING IN HEALTHCARE INDUSTRY

Although most operating systems offer several shells, the majority of them ship with a default CLI shell [10]. With entering instructions into the command prompt on a terminal, a user can send commands straight to a shell. If you have been experimenting with the customization methods covered in the last chapter, you may have discovered a number of adjustments you would like to make to your setup but are unable to do at this time. To make those changes, you can use shell programming [11]. Among command interpreters, Bash provides some of the most sophisticated programming tools. It has much more power and flexibility than most standard programming languages, but having less elegant or uniform syntax. Indeed, you can write whole software prototypes using bash [12].

Automated Backup and Management of Data

Shell programming is one of the most potent tool which has been utilized and adopted in the Healthcare industry which enables automation, data processing tasks and system management [13]. The healthcare industry often delves into large volume of complex and critical data-sets inclusive of record-sheet of patients, images used in medical laboratories and laboratory results. The fundamental processing of shell programming can be utilized to stream-line the backup process that ensures reliability and day-to-day data backup to the local storage system [14].

The shell programming is able to manage back-up of database, transfer of files to offsite storage and managing the log files as well. The core functioning of automation of repetitive tasks would enable and assist the IT sector in mitigating the human error risk and improvement of data integrity [15].

Monitoring and Alerting Systems

The healthcare IT system is one of the major beneficiaries of shell programming's monitoring and alerting [16]. The utilization of shell programming can be achieved by continuous monitoring of the performance and availability of different systems like servers, network infrastructures and complex applications. Shell scripts are further beneficial in detecting various issues such as high utilization of CPU, the issues related to network connectivity, failure of applications and many more.

Therefore, this active role of monitoring and alerting the healthcare systems enables and aids the healthcare industry in many ways such as early problem detection, minimizing the runtime and safeguarding against interjecting patient care delivery. Hence, shell programming can be utilized by adapting and installing it to the already existing monitoring system in accordance and in consonance with the healthcare industry's requirement.

Streamlining Automated Repetitive Tasks

The Healthcare industry is overburdened with various routine and daily basis tasks inclusive of scheduling of appointments of patient, filling up of medical requests, process regarding insurance claims etc. The integration of shell programming in healthcare industry would enable in streamlining workflow of the organization and enhancing efficiency.

The automation of repetitive task within healthcare industry would assist in mitigating human error, enhancing the data accuracy which would further be beneficial to the healthcare organisation staff on focusing on other patient-centric activities.

Enhancing User and Access Management

The Shell programming can be utilized in many other novel ways and it plays a crucial role in healthcare industry by enhancing user and access management. The shell scripts ensure in automating the creation, modification and deactivation of the accounts of the user and further provides that the users rights are in consonance with the healthcare industry's policies and guidelines.

Beneficial in Software Deployment and Configuration

For the purpose of EMR systems to specialize in medical imaging tools, healthcare industry often uses shell programming. It can be further utilized in automation of software deployment and configuring such applications and ensuring reliable installations in various systems.

CONCLUSION

While certain aspects of bash programming are closer to capabilities seen in more conventional programming languages, others are just expansions of the customizing methods have previously encountered. With the help of this, as it can achieve far more than the knowledge, even if you are not a coder. While not absolutely necessary, familiarity with a traditional programming language such as Pascal or C is helpful in order to follow along with the subsequent chapters. As you work your way through the book, you will come across activities and issues related to programming that call for the application of the ideas discussed here.

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