

Unix Shell Programming

== Capabilities == e3907ff2a3 For developing software; not language specific. e3907ff2a3 The early versions of Unix, which are retrospectively referred to as "Research Unix", ran on computers such as the PDP-11 and VAX; Unix was commonly used on minicomputers and mainframes from the 1970s onwards. It distinguished itself from its predecessors as the first portable operating system: almost the entire operating system is written in the C programming language (in 1973), which allows Unix to operate on numerous platforms. Unix systems are characterized by a modular design that is sometimes called the "Unix philosophy". According to this philosophy, the operating system should provide a set of simple tools... e3907ff2a3 A Unix shell may provide many features including: variable definition and substitution, command substitution, filename wildcarding, stream piping, control flow structures (condition-testing and iteration), working directory context, and here document... e3907ff2a3 The Bourne shell was once standard on all branded Unix systems, although historically BSD-based systems had many scripts written in csh. As the basis of POSIX sh syntax, Bourne shell scripts can typically be run with Bash or dash on Linux or other Unix-like systems; Bash itself is a free clone of Bourne. e3907ff2a3 The various dialects of shell scripts are considered to be command languages. Typical operations performed by shell scripts include file manipulation, program execution, and printing text. A script which sets up the environment, runs the program, and does any necessary cleanup or logging, is called a wrapper. e3907ff2a3 The text one enters to launch the command. e3907ff2a3 == Unix philosophy == e3907ff2a3

Shell (computing) The term shell refers to how it is a relatively thin layer around an operating system. Unix shell – Command-line interpreter for Unix operating system Window manager – Type of system software Read-eval-print loop – Computer programming environment An operating system shell is a computer program that provides relatively broad and direct access to the system on which it runs e3907ff2a3

A port of the original rc to Unix is part of Plan 9 from User Space. A rewrite of rc for Unix-like operating systems by Byron Rakitzis is also available but includes some incompatible changes. e3907ff2a3 Functional categorization. e3907ff2a3 It was a simple command interpreter, not designed for scripting, but nonetheless introduced several innovative features to the command-line interface and led to the development of the later Unix shells. e3907ff2a3 Addresses consistency... e3907ff2a3 User portability (UP) e3907ff2a3 For developing software in C. e3907ff2a3 FORTRAN development (FD) e3907ff2a3 Most operating system shells are not direct interfaces to the underlying kernel, even if a shell communicates with the user via peripheral devices attached to the computer directly. Shells are actually special applications that use the kernel API in just the same way as it is used by other application programs. A shell manages the user-system interaction by prompting users for input, interpreting their input, and then handling output from the underlying operating system (much like a read-eval-print loop, REPL). Since the operating system shell is actually an application, it may easily be replaced with another similar application for most... e3907ff2a3 C-language development (CD) e3907ff2a3 An early feature of the Thompson shell was a compact syntax for input/output redirection. In Multics, redirecting the input or output of a command required separate commands to start and stop redirection; in Unix, one could simply add an argument to the command line consisting of the < symbol followed by a filename for input or the > symbol for output, and the shell would redirect I/O for the duration of the command. This syntax was already present by the release of the first version of Unix in 1971. e3907ff2a3 The term is also used more generally to mean the automated mode of running an operating system shell. Different operating systems each use a particular name for these functions. All Unix-like systems include at least one POSIX shell, typically either bash or the zsh compatibility mode. e3907ff2a3 Batch job control. e3907ff2a3 Operating systems provide various services to their users, including file management, process management (running and terminating applications), batch processing, and operating system monitoring and configuration. e3907ff2a3 == Overview == e3907ff2a3

Shell script A shell script is a computer program designed to be run by a Unix shell, a command-line interpreter. The various dialects of shell scripts are considered A shell script is a computer program designed to be run by a Unix shell, a command-line interpreter e3907ff2a3

Rc uses C-like control structures instead of the original Bourne shell's ALGOL-like structures, except that it uses an if not construct instead of else in the original implementation but uses else in Byron Rakitzis' implementation, and has a Bourne-like for loop to iterate over lists. In rc, all variables are lists of strings, which eliminates the need for constructs like "\$@". Variables are not re-split when expanded. The language is described in Duff's paper. e3907ff2a3

Thompson shell The Thompson shell was the first Unix shell, introduced in the first version of Unix in 1971, and was written by Ken Thompson. It was a simple command The Thompson shell was the first Unix shell, introduced in the first version of Unix in 1971, and was written by Ken Thompson e3907ff2a3

The Bash command syntax is a superset of the Bourne shell's syntax, from which all basic features of the Bash syntax were copied. As a result, Bash can execute the vast majority of Bourne shell scripts without modification. Some other ideas were borrowed from the C shell, its successor tcsh, and the Korn Shell. e3907ff2a3 == History == e3907ff2a3 Most shells are command-line interface (CLI) programs. Some graphical user interfaces (GUI) also include shells. e3907ff2a3 Batch environment (BE) e3907ff2a3 == Definitions == e3907ff2a3

Unix shell A Unix shell provides a command language that can be used either interactively or for writing a shell script. A Unix shell is a shell that provides a command-line user interface for a Unix-like operating system. A Unix shell provides a command language that can A Unix shell is a shell that provides a command-line user interface for a Unix-like operating system e3907ff2a3

The Unix Programming Environment Kernighan and Rob Pike, both of Bell Labs and The Unix Programming Environment, first published in 1984 by Prentice Hall, is a book written by Brian W. The Unix Programming Environment, first published in 1984 by Prentice Hall, is a book written by Brian W. Kernighan and Rob Pike, both of Bell Labs and considered an important and early document of the Unix operating system e3907ff2a3

A later addition was the concept of pipes. At the suggestion of Douglas McIlroy, the redirection syntax was expanded so that the output of one command could be passed... e3907ff2a3

Unix operating system is written in the C programming language (in 1973), which allows Unix to operate on numerous platforms. Initially intended for use inside the Bell System, AT&T licensed Unix to outside parties in the late 1970s, leading to a variety of both academic and commercial Unix variants from vendors including Berkeley Software Distribution (BSD), Microsoft (Xenix), Sun Microsystems (SunOS/Solaris), HP (HP-UX), and IBM (AIX). Unix systems are characterized by a Unix (, YOO-niks; trademarked as UNIX) is a family of multitasking, multi-user computer operating systems that derive from the original AT&T Unix, the development of which started in 1969 at the Bell Labs research center by Ken Thompson, Dennis Ritchie, and others e3907ff2a3

Optionality e3907ff2a3 FORTRAN runtime (FR) e3907ff2a3 A user may have access to multiple Unix shells with one configured to run by default when the user logs in interactively. The default selection is typically stored in a user's profile (for example, in the local passwd file or in a distributed configuration system such as NIS or LDAP). A user may use other shells nested inside the default shell. e3907ff2a3 It is available on nearly all modern operating systems, making it a versatile tool in various computing environments. e3907ff2a3 It also supports the execution of commands from files, known as shell scripts, facilitating automation. e3907ff2a3 For developing software in FORTRAN. e3907ff2a3 Category e3907ff2a3

Rc (Unix shell) It resembles the Bourne shell, but its syntax is somewhat simpler. It was created by Tom Duff, who is better known for an unusual C programming language construct ("Duff's device"). command-line interpreter for Version 10 Unix and Plan 9 from Bell Labs operating systems. It resembles the Bourne shell, but its syntax is somewhat simpler rc (for "run commands") is the command-line interpreter for Version 10 Unix and Plan 9 from Bell Labs operating systems e3907ff2a3

The name "shell" for a command-line interpreter and the concept of making the shell a user program outside of the operating system kernel were introduced in Unix's precursor Multics. e3907ff2a3 == History == e3907ff2a3 Indicates whether the command is mandatory or optional in order to achieve conformance. If the latter, then a code indicates the optional functionality group to which the command belongs. e3907ff2a3

Bash (Unix shell) Supported by the Free Software Foundation and created in 1989 by Brian Fox for the GNU Project, it is designed as a completely free software alternative for the Bourne shell, sh, and other proprietary Unix shells. Supported Bash (short for "Bourne Again SHell") is an interactive command interpreter and command language developed for Unix-like operating systems. Bash (short for "Bourne Again SHell") is an interactive command interpreter and command language developed for Unix-like operating systems e3907ff2a3

As is typical in the context of a POSIX system, the term file refers to an item of a file system which can be a regular file, a directory or several other more specialized types. e3907ff2a3 Having gained widespread adoption, Bash is commonly used as the default login shell for numerous Linux distributions. e3907ff2a3 Software development (SD) e3907ff2a3 == Influences == e3907ff2a3 Command e3907ff2a3 Runtime-support for FORTRAN. e3907ff2a3

List of POSIX commands This list does not cover commands for all versions of Unix and Unix-like shells nor other versions of POSIX. 1-2024 which is part of the Single UNIX Specification (SUS). This list does not cover commands for all versions of Unix and Unix-like shells nor This is a list of the shell commands of the most recent version of the Portable Operating System Interface (POSIX) – IEEE Std 1003. These commands are implemented in many shells on modern Unix, Unix-like and other operating systems. many shells on modern Unix, Unix-like and other operating systems e3907ff2a3

A user typically works within a Unix shell via a terminal emulator; however, direct access via serial hardware connections or a Secure Shell are common for server systems. Although use of a Unix shell is popular with some users, others prefer to use a graphical shell in a windowing system, such as those provided in desktop Linux distributions or macOS, instead of a command-line interface (CLI). e3907ff2a3 The book addresses the Unix philosophy of small cooperating tools with standardized inputs and outputs. Kernighan and Pike gives a brief description of the Unix design and the Unix philosophy: e3907ff2a3

Bourne shell Unix-like The Bourne shell (sh) is a shell command-line interpreter for computer operating systems. It first appeared on Version 7 Unix, as its default shell. Unix-like systems continue to have /bin/sh—which will be the Bourne shell, or a symbolic link or hard link to a compatible shell—even when other shells are used by most users. It first appeared on Version 7 Unix, as its default shell. Bourne shell (sh) is a shell command-line interpreter for computer operating systems e3907ff2a3

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