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CSE 3033 Operating Systems Programming Project#2

First of all I declare the global Variables and defines.I keep $PATH variables ,built in commands and my linked lists's heads keep on global.

Basic lifetime of a shell

Setup: This is the first section of the shell runs.Setup is read command from user and parse them args and set background variable.After setup the program checks args array and decide to second command is exist.IF second command exist separate and separate by ; pass the second command to args2.

Run: Run firstly examine the args array.Decide the command is built in or not.If command is built in execute built in functions by main process otherwise the main process fork and create child.child execute command with exec command . If this is a background process parent don't wait the child process otherwise wait child.

Explanation of Functions

setEnvPathVariables() is read the $PATH variable and removes semicolon and fill envPath array.

readPath() is read the $PATH variable with getenv method.If occur error while reading path variable print an error message on stderr and exit program.

setBuiltInCommands() is fill the builtInCommands array with built-in command names.

addProcessKillSignal() is handler for SIGCHLD signal.When catch signal call the catchSigChild() function.

catchSigChild() is find the id of the child who wants to die.Kill the process and delete of this process from process linked list.

addCtrlZSignal() is handler for SIGTSTP signal.When user press Crtl-Z SIGTSTP signal is fired.Catch this signal and call cathCtrlZ() function.

setup() is the read input from user and separate them.Check & symbol in input String.If have this symbol set the background to 1.Push command to command linked list.But if the first argument of args array equal to "history" delete this command from linked list.

pushCommand() and deleteCommand() is basic insert and remove node from linked list.

designArgs() is examinate the args array and check if looking for a semicolon in array.If args has semicolon memory allocate for args2 array and copy arguments args to args2 after semicolon.

run( ) is firstly check the redirection symbols.After this check look the command is built-in command or not. If the command is built-in command call the relevant built-in function.Otherwise create a new process using *fork()* system call, and the new process (child) will execute the program. After fork parent add the process to process linked list.If background is 0 parent will wait he child process otherwise parent will not wait and takes input other command.After all reset the redirections defaults values.

checkRedirection( ) is search the redirection symbols.if There is any redirection symbol do redirection and set the redirection status.

redirectionStatus is initially “000”. First bit keep input redirection. Second bit keep output redirection.Last bit keep error redirection.For example if input and error redirection is done the redirectionStatus will be “101”.

outputRedirection() ,inputRedirection() ,errorRedirection() do redirection to given fil with dup2 function.Save their old values in a global variable before redirecting.

checkCommandIsBuiltIn() check the command is built-in or not.If the command is built-in return the built-in number for switch case for run( ) function.

execHistoryCommand() firstly check the argument number. If history is given with -i option get command on given index with getHistoryCommand() function.After take the command call setupWithoutRead() function for separate the arguments and call run function with taken input line. Ih history command given without -i option just print the latest ten command with printHistory() function.

getHistoryCommand() is scrolls through the list and returns the command in the given index.

setupWithoutRead() is exactly same with setup. Only difference is setupWithoutRead not read input from user, just separate given line.

printHistory() is write the latest 10 command on Command linked list.

execPathCommand() is firstly check the argument number. If user enter just path program call displayPath() and will display the paths.Otherwise if user run with + option call pushPath and add the given path to the path linked list.If user five - option delete the given path from linked list.

displayPaths() is write the paths on path linked list.

pushPath() and deletePath() is basic insert and delete function for Path linked list.

execFgCommand() is first check the arguments .If there is no pid print error message.Otherwise edit the second argument delete the % symbol and convert string to integer.After conversion check the process is exist on background with given id support with isProcessAlive() function.If process exist parent process wait the given process with waitpid. Otherwise print the error message.

isProcessAlive() is check the given id is exist on Process linked list.If its exist return 1 otherwise return 0.

execExitCommand() is check the processCounter. If process counter equal to zero exit the system.Otherwise print the error message about background processes stil running.

execJobs() is print the process id and process names which currently run.So print the processes on Process linked list.

setPath() is the find the given command which Path file.After find change the first argument of args array with full path.Ex if given command is ls setPath function convert this to /bin/ls.Returns 0 if not found in any path variable.

checkCommandisExist() is compare the given command with all files on given path.If it finds equality return 1 otherwise return 0.

pushProcess() and deleteProcess() is basic insertion and deletion functions for Process linked list.But but there is an important point here. When call the pushProcess add 1 to processCounter and when call the deleteProcess decrement by 1.In this way, I get the number of processes running instantly in the system.

resetRedirection() is check the redirectionStatus and restores the changed file numbers.Before restore process emptying buffers with fflush() function.