

Redirection and Pipes

Spoken Tutorial Project
National Mission on Education through ICT
<http://spoken-tutorial.org>

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Pre-requisites :

- I am using Linux OS.



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- ▶ You should know how to get started with the Linux OS.



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- ▶ You should have some basic idea about commands.



Pre-requisites :

- ▶ I am using Linux OS.
- ▶ You should know how to get started with the Linux OS.
- ▶ You should have some basic idea about commands.
- ▶ If not, please refer to spoken tutorials on <http://spoken-tutorial.org>



About the Linux commands

- ▶ **Linux is case sensitive.**



About the Linux commands

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- ▶ All the commands used here are in lowercase, unless mentioned otherwise.



Linux commands on Terminal

- Most of the work that we do in Linux is through a **terminal**.



Linux commands on Terminal

- ▶ Most of the work that we do in Linux is through a **terminal**.
- ▶ When we have to execute a command, we generally type through the keyboard.



Preliminaries



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- ▶ **Two important concepts:**
Stream.
File descriptor.



Stream

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- ▶ A Linux shell, like **Bash**, receives input and sends output as sequences or streams of characters.



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- ▶ **Accessed using file IO techniques.**



Stream

Stream:

- ▶ A Linux shell, like **Bash**, receives input and sends output as sequences or streams of characters.
- ▶ Each character is independent of the one before it and the one after it.
- ▶ Accessed using file IO techniques.
- ▶ **Actual stream of characters may come from or go to a file/keyboard/window.**



File Descriptor

File Descriptor -

- Every open file of a process is associated with an integer number.



File Descriptor

File Descriptor -

- ▶ Every open file of a process is associated with an integer number.
- ▶ This numeric value is known as the **file descriptor**.



The three standard streams



The three standard streams

stdin

- ▶ It is the standard input stream.



The three standard streams

stdin

- ▶ It is the standard input stream.
- ▶ Provides input to commands.



The three standard streams

stdin

- ▶ It is the standard input stream.
- ▶ Provides input to commands.
- ▶ It has file descriptor 0.



The three standard streams(Contd)

stdout

- ▶ It is the standard output stream.



The three standard streams(Contd)

stdout

- ▶ It is the standard output stream.
- ▶ Displays output from commands.



The three standard streams(Contd)

stdout

- ▶ It is the standard output stream.
- ▶ Displays output from commands.
- ▶ It has file descriptor **1**.



The three standard streams(Contd)

stderr

- ▶ It is the standard error stream.



The three standard streams(Contd)

stderr

- ▶ It is the standard error stream.
- ▶ Displays error output from commands.



The three standard streams(Contd)

stderr

- ▶ It is the standard error stream.
- ▶ Displays error output from commands.
- ▶ It has file descriptor 2.



More about Streams

- ▶ **Input streams provide input to programs.**



More about Streams

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- ▶ By default, it takes from terminal key-strokes.



More about Streams

- ▶ Input streams provide input to programs.
- ▶ By default, it takes from terminal key-strokes.
- ▶ Output streams print text characters, by default, on the terminal.



About the Terminal

- The terminal was originally an ASCII typewriter or display terminal.



About the Terminal

- ▶ The terminal was originally an ASCII typewriter or display terminal.
- ▶ Now, it is more often a text window on a graphical desktop.



Redirection

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Redirection

- ▶ We have seen that the 3 streams are connected to some files, by default.
- ▶ But in Linux, we can change this default behaviour.
- ▶ We can connect these 3 streams to other files.
- ▶ This process is called **Redirection**.



Redirection– Two ways



Redirection– Two ways

n>

- ▶ Redirects output from file descriptor **n** to a file.



Redirection– Two ways

n>

- ▶ Redirects output from file descriptor **n** to a file.
- ▶ Must have **write** authority to the file.



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- ▶ If destination file does not exist - it is created.



Redirection– Two ways

n>

- ▶ Redirects output from file descriptor **n** to a file.
- ▶ Must have **write** authority to the file.
- ▶ If destination file does not exist - it is created.
- ▶ If destination file exists - the existing contents are lost without any warning.



Redirection(contd)

n>>

- ▶ Redirects output from file descriptor **n** to a file.



Redirection(contd)

n>>

- ▶ Redirects output from file descriptor **n** to a file.
- ▶ Must have **write** authority to the file.



Redirection(contd)

n>>

- ▶ Redirects output from file descriptor **n** to a file.
- ▶ Must have **write** authority to the file.
- ▶ If destination file does not exist - it is created.



Redirection(contd)

n>>

- ▶ Redirects output from file descriptor **n** to a file.
- ▶ Must have **write** authority to the file.
- ▶ If destination file does not exist - it is created.
- ▶ If destination file exists - the output is appended to the existing file.



Redirection(contd)

- ▶ **Redirect stdout** **> or >>**
(same as) **1 > or 1 >>**



Redirection(contd)

- ▶ **Redirect stdout** `> or >>`
(same as) `1 > or 1 >>`
- ▶ **Redirect stderr** `2 > or 2 >>`



Redirection(contd)

- By default, **wc** writes its output to the **stdout**.



Redirection(contd)

- ▶ By default, **wc** writes its output to the **stdout**.
- ▶ **stdout** is, by default, connected to the terminal.



Redirection(contd)

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- ▶ **stdout** is, by default, connected to the terminal.
- ▶ Hence we see the output in the terminal.



Redirection(contd)

- ▶ By default, **wc** writes its output to the **stdout**.
- ▶ **stdout** is, by default, connected to the terminal.
- ▶ Hence we see the output in the terminal.
- ▶ If we redirect **stdout** to a file, then the output from **wc** command will be written to that file.



Redirection(contd)

- ▶ **Redirecting the standard error is done similarly.**



Redirection(contd)

- ▶ Redirecting the standard error is done similarly.
- ▶ In this case, we need to mention the file descriptor number of the standard error before `>` or `>>`.



Pipes

- ▶ **Manipulate and connect the different streams simultaneously.**



Pipes

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- ▶ This process is called **Pipelining**.



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- ▶ **Pipes** are used to create a chain of commands.



Pipes

- ▶ Manipulate and connect the different streams simultaneously.
- ▶ This process is called **Pipelining**.
- ▶ Pipes are used to create a chain of commands.
- ▶ **Connects the output of one command to the input of the next command.**



Pipes

- ▶ It looks like
`command1 | command2 -option |`
`command3 -option1 -option2 | command4`



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- ▶ More information available at <http://spoken-tutorial.org/NMEICT-Intro>

