CISC 3115

File System Path

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Outline

- Discussed
  - Approaches to handle errors (what-if and exceptions)
  - Concept of Exception
  - The Java throwable class hierarchy
    - system errors, runtime exceptions, checked errors, unchecked errors
  - Methods of declaring, throwing, catching exception, and rethrowing exceptions
  - Exception, call stack, stack frame, and stack trace
  - Some best practice
- Exception and simple text/character File I/O
  - File system path (to identify file)
  - Concept of text file
  - Reliable processing text file (patterns and exceptions)

Learning Objectives

- Using exceptions to handle errors while doing file I/O
- Identifying a file (to write to or to read from)
  - Concept of file system path
  - Java API classes, Path, Paths; File, Files
- Understanding characters and text file
- Reading from and writing to text files

Identifying Files

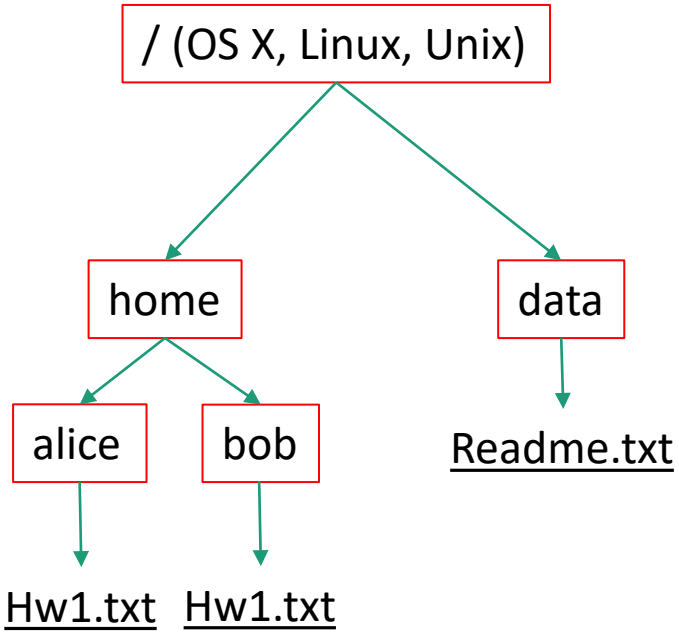
- Concept of path in operating system file systems
  - Operating systems
    - Windows, OS X, Linux
  - File system
    - the structure to organize and manage files on a storage device
    - File: named allocation of storage device space
    - A file system stores and organizes files on some form of media allowing easy retrieval
- How do we identify a file?

File System Trees

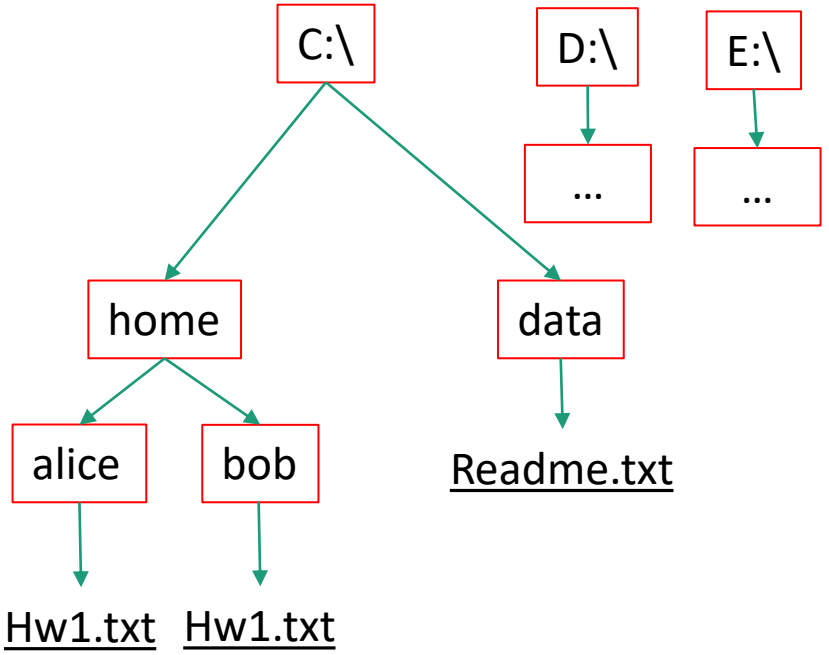
- Most file systems in use store the files in a tree (or hierarchical) structure.
  - Root node at the top
  - Children are files or directories (or folders in Microsoft Windows)
  - Each directory/folder can contain files and subdirectories

File System Trees: Examples

OS X, Linux, Unix (a tree)

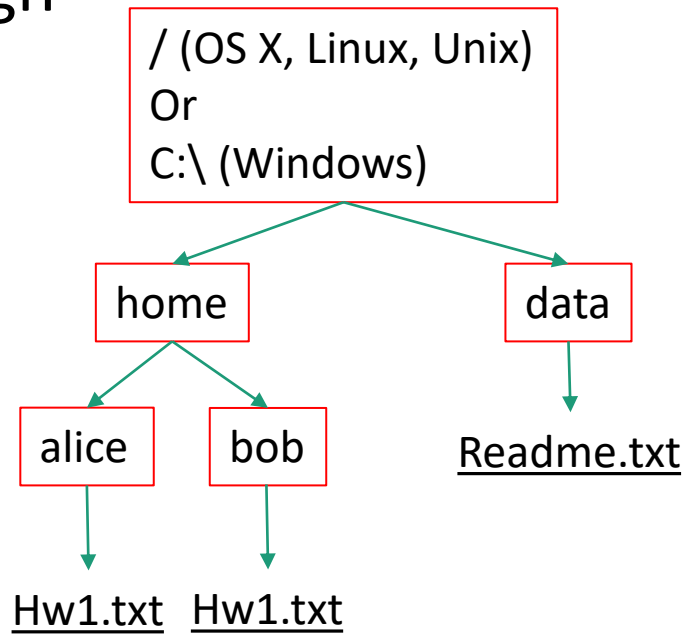


Windows (a forest of trees)



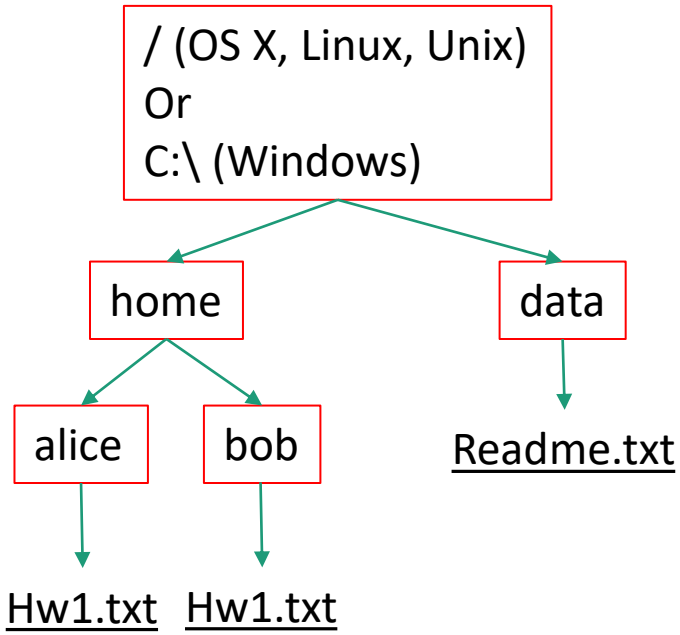
File System Path

- Identify a file by its *path* through the file system tree, beginning from the root node
  - A path is a "path" of the tree traversal expressed in the"/" or "\" separated value format.
  - Two special notations
    - `..` parent directory (two dots)
    - `.` for current directory (one dot)f



File System Path: Examples (1 of 2)

- Identify a file by its *path* through the file system tree, beginning from the root node
  - A path is a "path" of the tree traversal
  - Example: identify Hw1.txt in alice
  - Traverse the tree to visit Hw1.txt from /
    - / → home → alice → Hw1.txt
    - / → home → .. → home → alice → Hw1.txt
    - / → home → .. → home → bob → .. → alice → Hw1.txt
    - / → home → . → . → bob → .. → alice → Hw1.txt



File System Path: Examples (1 of 2)

- Traverse the tree to visit Hw1.txt from /
  - / → home → alice → Hw1.txt

    /home/alice/Hw1.txt
  - / → home → .. → home → alice → Hw1.txt

    /home/../home/alice/Hw1.txt
  - / → home → .. → home → bob → .. → alice → Hw1.txt

    /home/../home/bob/../alice/Hw1.txt
  - / → home → . → . → bob → .. → alice → Hw1.txt

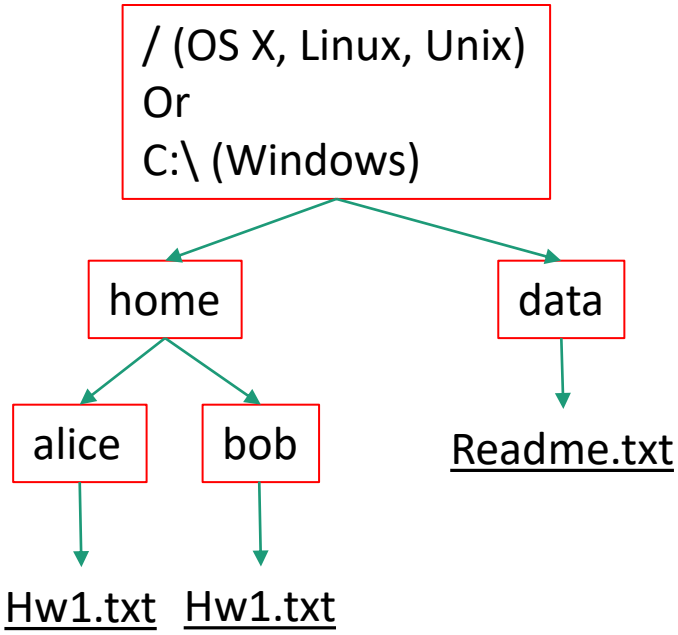
    /home/./bob/../alice/Hw1.txt

Relative and Absolute Path

- Absolute path
  - Tree traversal must begin at the root directory
  - Contains the root element and the complete directory list required to locate the file
    - Example: /home/alice/Hw1.txt or C:\home\alice\Hw1.txt
- Relative path
  - Needs to be combined with another path in order to access a file.
  - The another path is the “reference” (or the beginning directory of the tree traversal), and the reference path isn’t recorded in the path.

Relative Path: Examples

- Beginning from data, identify Hw1.txt in alice
  - Traverse the tree to visit Hw1.txt from data
  - .. → home → alice → Hw1.txt
    - ../home/alice/Hw1.txt
  - . → .. → home → alice → Hw1.txt
    - ./../home/alice/Hw1.txt
  - .. → home → bob → .. → alice → Hw1.txt
    - ../home/bob/../alice/Hw1.txt



Relative Path: Examples

- Example
  - Can we identify alice/Hw1.txt (on Unix) or alice\Hw1.txxt (on Windows)?

Relative Path: Examples

- Example
  - Can we identify alice/Hw1.txt (on Unix) or alice\Hw1.txxt (on Windows)?
  - Cannot identify the file without knowing where the traversal begins (the reference directory or the beginning directory)

Questions?

- Concept of file system trees
- Concept of paths
  - Traversal of file system trees
  - Absolute path
  - Relative path