

Lecture 1

13 January 2011

Basics

- This is not a course in “programming”
- This is a course in algorithmic thinking
- We happen to use Java as the vehicle, in the sense that the Java compiler will determine whether your thinking is correct
- Goal ONE: to learn about efficient management and organization of data
- Goal TWO: to learn about how to implement methods for efficient management and organization of data in a real programming language
- In essence, we are going to be looking at how to move from a naive flat file to any of several more sophisticated structures
- Consider the different requirements of problems with a small amount of data and problems with large amounts of data
- Efficiency comes from good clean implementations (factors of two to five in speed) and from good algorithms (factors of 10 to 100 to 1000 or more)

Specifics

- Sorting, and maintaining data in sorted order
- Indexing
- Search
- Retrieval
- Dynamic behavior
- Memory
- Bandwidth
- Heuristics
- Structured vs. unstructured data
- Java features: templates, interfaces, generics abstract classes

Examples

- Card catalog data
- Student records
- Retail transaction data
- Internet packet data
- Process queues
- Google
- Game and search trees
- Phylogenetics

A complete program



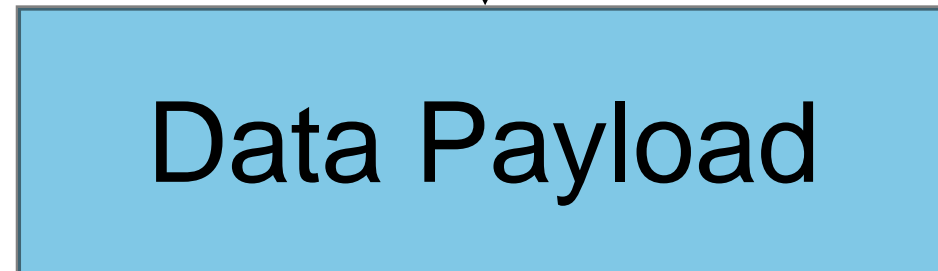
Code that opens and closes files
and invokes the application



This is the code that actually does
what the program is supposed to do,
such as manage a phone book



This is the class or classes that
implement the data structure



This is the abstract data type (ADT) that
handles an individual instance of a data
record

Phylogenetic trees

