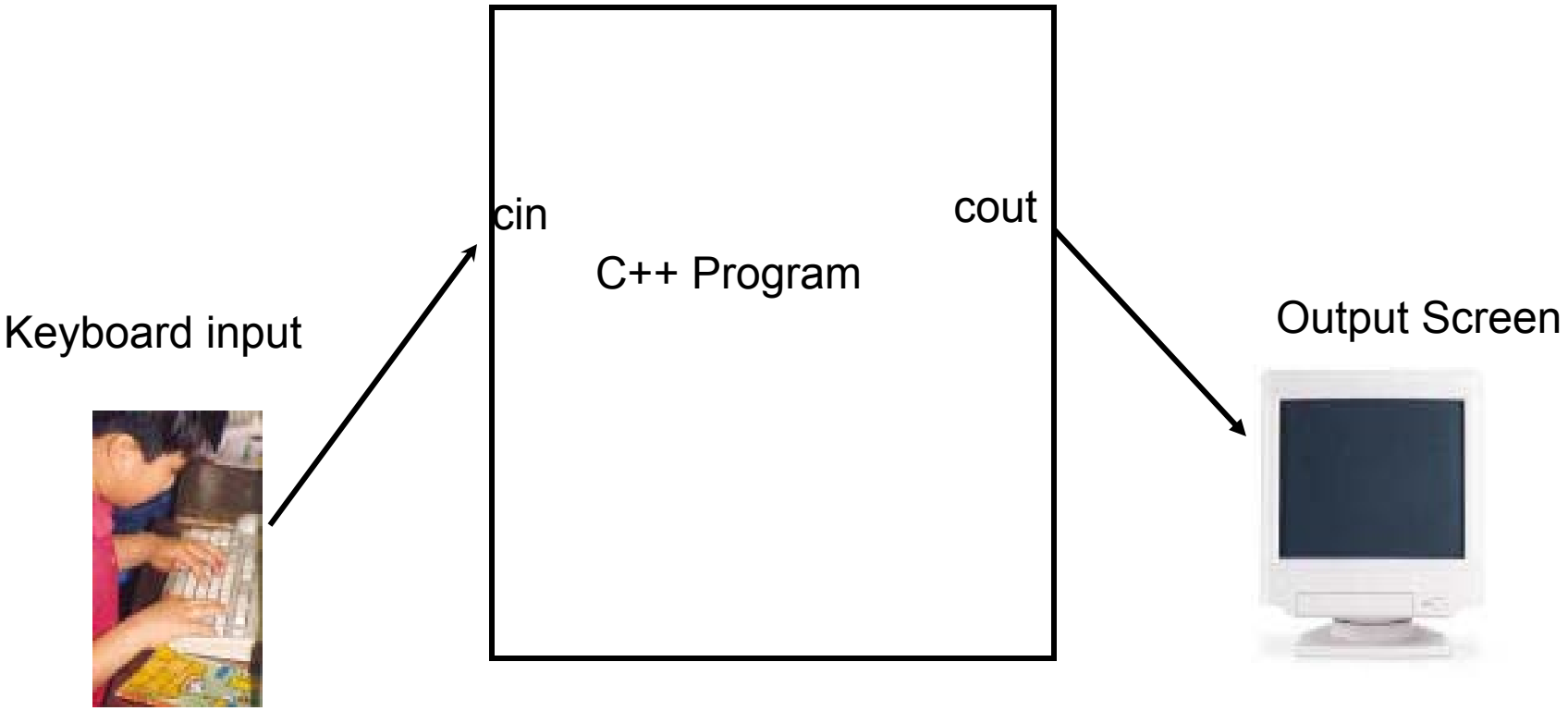
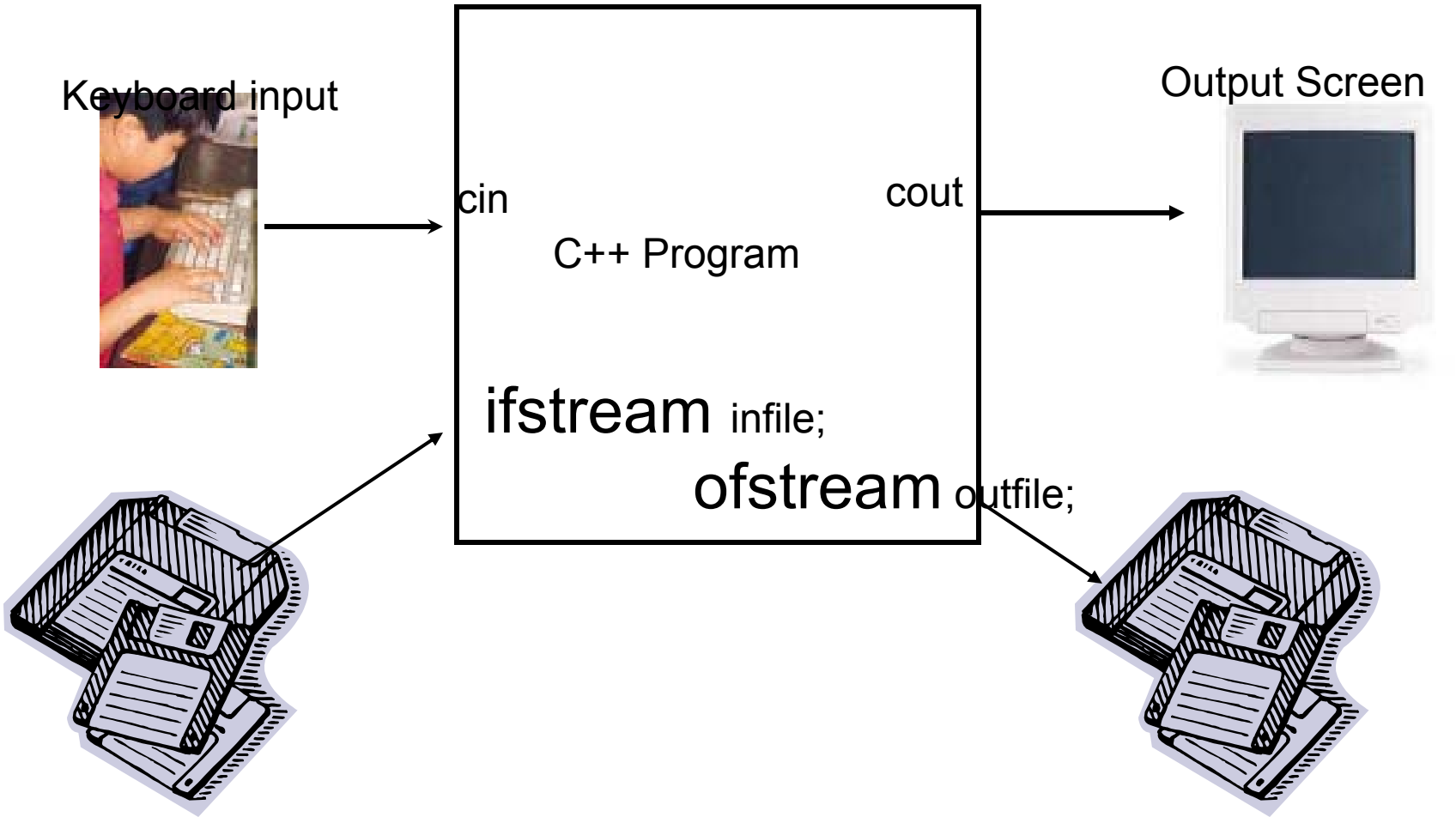
Programming with Data Files

Chapter 4

Standard Input Output



File Input / Output features



Programmer Defined File Streams

- To define your own file streams
  - for input use **ifstream** class
    - Ifstream: input file stream
  - for output use **ofstream** class
    - Ofstream: output file stream
- ifstream and ofstream are defined in package **fstream** (file stream)
- Files provide “persistence” or permanent copy for the results generated by your programs.

File Operations

- Open, close, << and >> operators
- eof() operation on an input file object returns a true or false (Boolean)
- get() reads a single character from an input file and put(char) writes a single character into an output file.
- fail() operation indicates if the opening of a file is successful or failure. Return Boolean type (true or false)

Defining File Streams

1. Include **fstream (#include <fstream>)**
2. declare file stream variable (object)
    1. **ifstream fin;**
    2. **ofstream fout;**
3. use open() to initialize file stream variable
4. use input file stream variable as you would use **cin** and use output file stream variable as you would use **cout**
5. use close() to close the file when finished with it

Writing Output to a File

- Similar to writing to screen
- Use object connected to output file
- Need the fstream header

```
#include <fstream>
```

- Open file for writing
  - Declare object of *ofstream* class

```
ofstream outfile;
```

Opening Files

- General form

  outfile.open("*file_name*");
- Choose *object_name* like variable name
- *object_name* is object of class ofstream
- Filename is where output will be stored

  Ex: outfile.open("grades.out");

Writing to Files

- General form

  ***object_name* << *variable_name*;**

- Use ofstream object to write to file like cout was used

  outfile << “Salary for week was ” << money;

- Additional writing appended to file

Closing Files (input and output)

- General form

  ***object_name*.close ( );**

- Use C++ library function **close**
- Use both object and function name separated by a period
- Example: outfile.close( );

Open File for Reading

- Need fstream header

  #include <fstream>

- Declare object of ifstream

  ifstream infile;

- **Open the file:**

  infile.open("points.dat");

- Use ifstream object to read file like cin

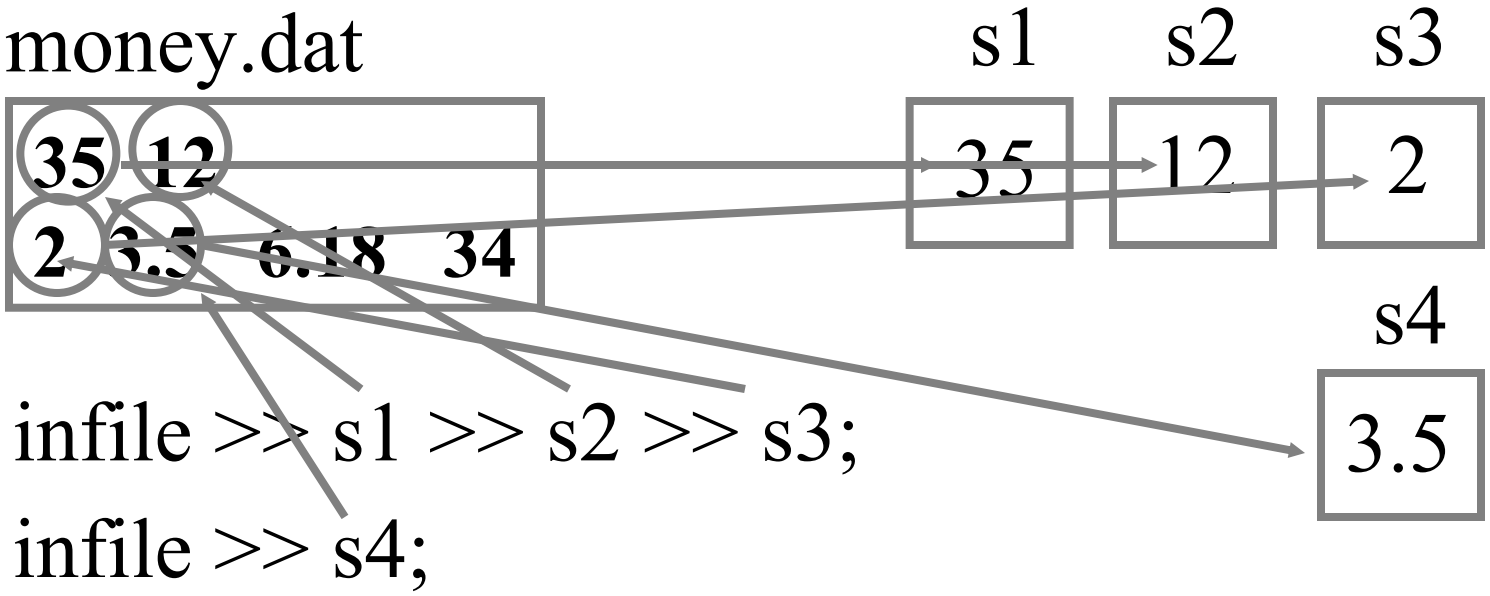
Reading From a File

- Use ifstream object to read file like cin used for keyboard

```
infile >> salary1 >> salary2;
```

- C++ looks for whitespace between numbers
  - Newline character treated as whitespace
- Additional reading continues sequentially

Reading From a File



Note: The number of data entries and their data types of variables should read should match the number and order within the file!

A complete example

- Open an input file “data1”
- Open an output file “plot1”
- Read x from input file
- Write x, exp(x) and log(x) to output file
- Close the input and output files

```
#include <fstream>
#include <cmath>
using namespace std;

int main()
{

   double x;
   ifstream xdata;      //declare input stream
   ofstream plotdata;          //declare output stream

   xdata.open("data1");     //xdata uses file data1
   plotdata.open("plot1");//plotdata uses file plot1

   xdata >> x;                  //input x from file

   plotdata<<x<<" "<<exp(x)<<" "<<log(x)<<endl;

   xdata.close();
   plotdata.close();
     return 0;
}  //end main
```