

What About Invalid Characters?

cin: ' ' '2' '7' '.' '4' ' ' ' '
 ↓ Now what?
 theInput: 27
 Skip whitespace
 Pick up value
 Terminate scan
 Store value
 int theInput = 3;
 cin >> theInput;

What If No Valid Characters?

cin: 'x' '4' 'a' 'b' 'c' ' ' ' '
 ↓ What happens on next input?
 theInput: 3
 Skip whitespace (none)
 Character not valid
 Terminate scan
 Value unchanged
 int theInput = 3;
 cin >> theInput;

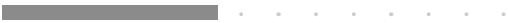
Another Character Input Method

- **Extraction operator**
 - char x; cin >> x;
- **Alternative (text, page 62)**
 - char x; cin.get(x);
 - Stream member function
 - But you're not supposed to know them!
 - For now, don't be concerned about it

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Stream Output

- **Output character sequence**
– Representation of data value(s)
- **Generated from data values**
– Numeric, character, etc.

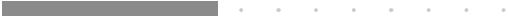


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Stream Output Example

```
int x = 35;
cout << "Number is ";
cout << x;
cout << " here." << endl;
cout << "Bye" << endl;
```

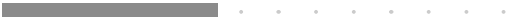
```
Number is 35 here.
Bye
```



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String Literals

- **Sequence of characters**
- **Enclosed in double quotes**
– E.g., "Hello there"
- **Special characters**
– E.g., "\n" is newline
– See page 826 in text



Handwriting lines for notes corresponding to the 'Stream Output' section.

Handwriting lines for notes corresponding to the 'Stream Output Example' section.

Handwriting lines for notes corresponding to the 'String Literals' section.

User Prompts

• What's wrong with this program?

- How does user know what to enter?

• Solution

- Add prompt

```

#include <iostream>
using namespace std;
void main ()
{
  //Calc days in weeks
  int x;
  cout<<"Weeks: ";
  cin >> x;
  cout << (x * 7);
}

```

Horizontal lines for notes

Manipulators for Formatting

• Special data object

- Modifies state of stream
• When output with insertion operator

• Have already seen "endl"

- Others include setiosflags(),
resetiosflags(),
setprecision(), setw()

Horizontal lines for notes

Output Format Control

```

cout << setiosflags (ios::fixed);
cout << 1341.215;
cout << resetiosflags (ios::fixed);

```

Could be ios::scientific

```

1341.22
1.34e+03

```

```

cout << setprecision (2);
cout << setw (10);

```

See pages 64-68 for details.

Horizontal lines for notes

Simple File Streams

• Default I/O streams

- Keyboard input: cin
- Screen output: cout



• File I/O also supported

- Input from a file: ifstream type
- Output to a file: ofstream type

File Stream Example (1)

```
#include <fstream>           File names
...
ifstream is ("infile.txt");
ofstream os ("outfile.txt");
int num;
is >> num; // Read input file
num += 5; // Add 5 to number
os << "New number is ";
os << num << endl; Use like cin/cout
```

File Stream Example (2)

infile.txt:

103

outfile.txt:

New number is 108

File Stream Applications

- **Read/write files from other programs**

- E.g., spreadsheet, for graphing

- **Produce permanent output**

- Output file can be printed

- E.g., to submit assignment results

Design Exercise



- **Write a program**

- **Input**

- Person's age in years

- **Output**

- Approx. age in seconds (to nearest year)

- Write to screen and to file
