Ve 280

Programming and Introductory Data Structures

Passing Arguments to Program

Learning Objectives:

Know how to write more general programs that can take arguments

Passing Arguments to Program

Introduction

- So far, we have considered programs that take no arguments
  - You run your program like: ./program
- However, programs can take arguments.
- For example, many Linux commands are programs and they take arguments!
  - **`diff file1 file2`**
  - **`rm file`**
  - …

Passing Arguments to Program

Introduction

```
diff file1 file2
```

- The first word, `diff`, is the **name** of the program to run.
- The second and third words are **arguments** to the `diff` program.
- These arguments are passed to `diff` for its consideration, like arguments are passed to functions.
- The operating system collects arguments and passes them to the program it executes.

Passing Arguments to Program

- Arguments are passed to the program through main() function.

- We need to change the argument list of main():
  - Old: `int main()`
  - New: `int main(int argc, char *argv[])`

Passing Arguments to Program

```
int main(int argc, char *argv[])
```

- Each argument is just a sequence of characters.
- All the arguments (including program name) form an array of C-strings.
- `int argc`: the number of strings in the array
  - E.g., `diff file1 file2: argc = 3`
  - The name `argc` is by convention and it stands for "argument count".

Passing Arguments to Program

```
int main(int argc, char *argv[])
```

- `argv` stores the array of C-strings.
  - Remember, a C-string is itself an array of char and it can be thought of as a pointer to char.
  - Thus, an array of C-strings can be thought of as an array of pointers to char.
  - Thus, `argv` is an array of pointers to char: `char *argv[]`
  - The name `argv` is again by convention and it is short for "argument vector" or "argument values".

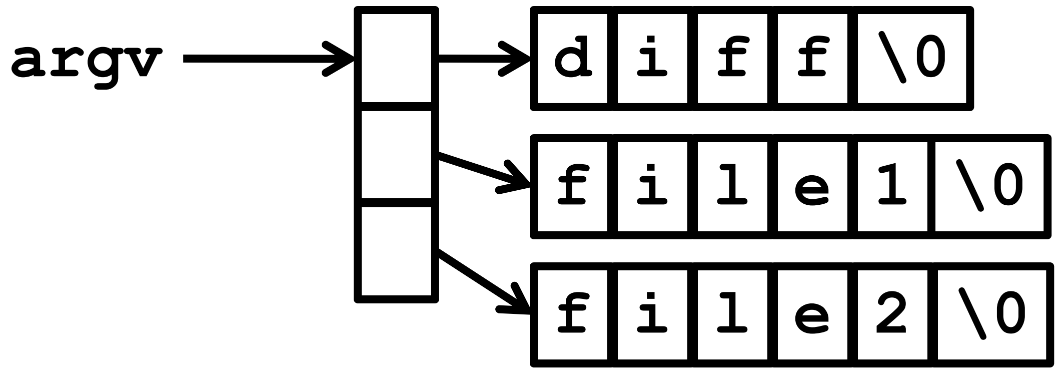
Passing Arguments to Program

argv

```
diff file1 file2
```

```
char *argv[]
```

- Pictorially, this would look like the following in memory:



__Note__: **argv[0]** is the first string you type to issue the program. It includes the name of the program being executed and optional path (like "./").

Passing Arguments to Program

Example

- Suppose we wanted to write a program that is given a list of integers as its arguments, and prints out the sum of that list.

- Before we can write this program we need a way to convert from C-strings to integers.
- We use predefined "standard library" function called `atoi()`.
- Its specification is

```
int atoi(const char *s);
// EFFECTS: parses s as a number and
//          returns its int value
```

  - Needs `#include <cstdlib>`

Passing Arguments to Program

Example

- The problem we are examining can be solved as:

```
int main (int argc, char *argv[])
{
  int sum = 0;
  for (int i = 1; i < argc; i++) {
      sum += atoi(argv[i]);
  }
  cout << "sum is " << sum;
  return 0;
}
```

Passing Arguments to Program

Example

```
int main (int argc, char *argv[]) {
        int sum = 0;
        for (int i = 1; i < argc; i++) {
                sum += atoi(argv[i]);
        }
        cout << "sum is " << sum;
        return 0;
}
```

- Finally, we save it to `sumIt.cpp`, compile, and run it:

```
$ g++ -o sumIt sumIt.cpp
$ ./sumIt 3 10 11 12 19
```

For the previous command, select all the correct answers

```
$ ./sumIt 3 10 11 12 19
```

- **A.** argc equals 5.
- **B.** argv contains exactly “3”, “10”, “11”, “12”, “19” .
- **C.** argv[0] equals “sumIt”.
- **D.** The command outputs “sum is 55”.

```
int main (int argc, char *argv[]) {
        int sum = 0;
        for (int i = 1; i < argc; i++) {
                sum += atoi(argv[i]);
        }
        cout << "sum is " << sum;
        return 0;
}
```

References

- Command-Line Arguments
  - Absolute C++, 4th Edition, Page 373