Programming with C I

Fangtian Zhong
CSCI 112

Gianforte School of Computing
Norm Asbjornson College of Engineering
E-mail: fangtian.zhong@montana.edu

2025.02.26

Pointers

pointer (pointer variable)

- A pointer is a variable whose value is the address of a location in memory.
- **8 bytes on server but depends on machine**
- **syntax:** ***type *variable***

```
int m = 25;
int *itemp=&m;        /* a pointer to an integer */
char q= ‘c’;
char *ch = &q;  /*a pointer to a character*/
```

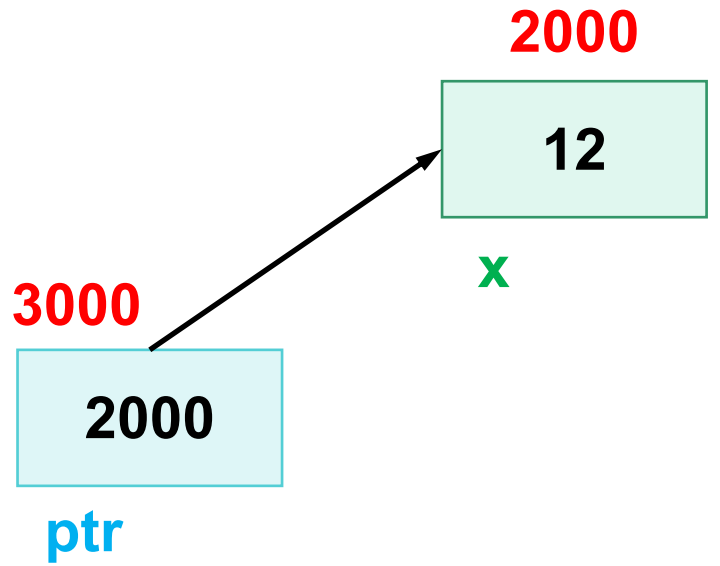
& operator (address of)

- **Returns the address of a variable**

> **the * *never* returns the address of a variable**

Using a Pointer Variable

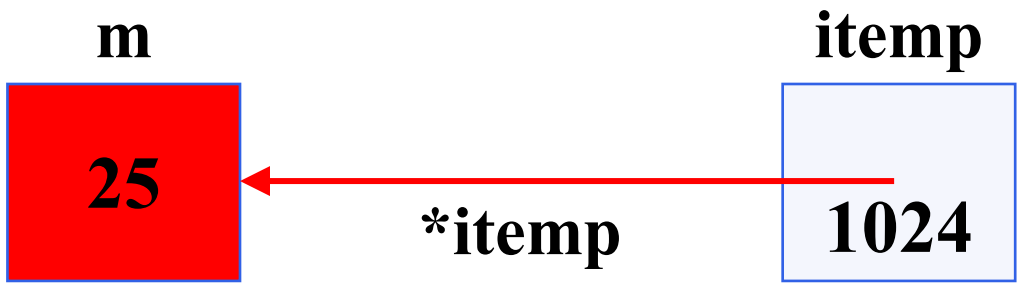
```
int x;
x=12;

int* ptr;
ptr=&x;
```



NOTE: Because ptr holds the address of x, we say that ptr "points to" x.

Indirection/indirect reference

- accessing the contents of a memory cell through a pointer variable that stores its address



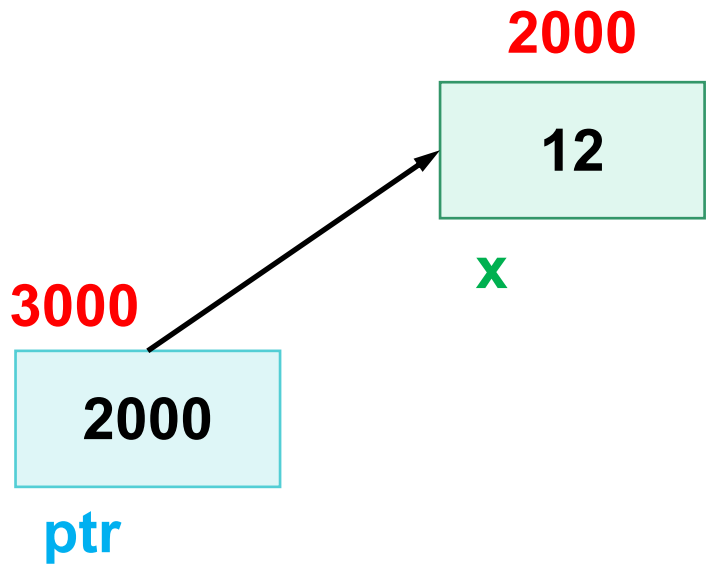
➢ *Figure Referencing a Variable Through a Pointer*

Table References with Pointers

Reference	Cell Referenced	Cell Type Value)
itemp	gray shaded cell	pointer (1024)
*itemp	cell in color	int (25)

*: dereference operator

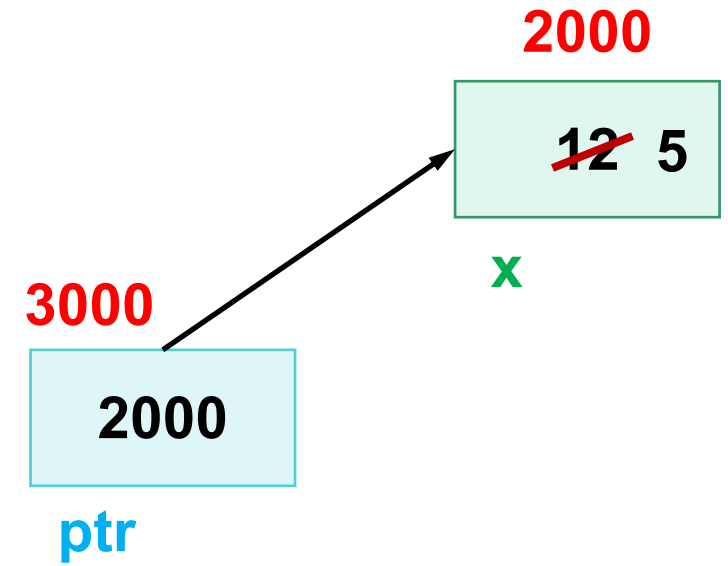
```
int x;
x=12;

int* ptr;
ptr=&x;
printf("%d\n",*ptr);
```



NOTE: The value pointed to by ptr is denoted by *ptr.

Using the Dereference Operator

```
int x;
x=12;

int* ptr;
ptr=&x;
*ptr=5;
```



// changes the value at the address ptr points to 5

* operator (indirection)

- Follows a pointer to what it points to
- (the thing at the address it stores)

Pointers to Files

- **C allows a program to explicitly name a file for input or output.**
- **Declare file pointers:**
  - FILE *inp; /* pointer to input file */
  - FILE *outp; /* pointer to output file */
- **Prepare for input or output before permitting access:**
  - inp = fopen(“infile.txt”, “r”);
  - outp = fopen(“outfile.txt”, “w”);

Pointers to Files

- **fscanf**
  - file equivalent of scanf
  - fscanf(inp, “%lf”, &item);
- **fprintf**
  - file equivalent of printf
  - fprintf(outp, “%.2f\n”, item);
- **closing a file when done**
  - fclose(inp);
  - fclose(outp);

THE END

Fangtian Zhong
CSCI 112

Gianforte School of Computing
Norm Asbjornson College of Engineering
E-mail: fangtian.zhong@montana.edu

2025.02.26