Cheatography

quiz1 Cheat Sheet

by failboatz via cheatography.com/20901/cs/3765/

Data Structures

```
Declaring a struct:
    typedef struct {
        int x;
        int y;
    } point;
Declaring a variable and accessing members:
    point first;
    first.x = 1;
    first.y = 4;
    printf("(%d, %d) \n", first.x, first.y);
```

Point is name of struct.

Omega

	lower (Ω)	upper (O)
insertion into a hash table with separate chaining	1	1
insertion into a trie	1	1
insertion into a sorted linked list	1	n
deletion from a sorted linked list	1	n
deletion from an unsorted linked list	1	n

Common Structs

```
Hashtable:
    typedef struct _node
    {
        char word[50]; // 50-char word
        struct _node *next;
    }
    node;
Tree:
    typedef struct _tree3 {
        bool valid; // exists or not
        struct _tree3 *child1;
        struct _tree3 *child2;
        struct _tree3 *child3;
    }
    tree3;
Trie:
    typedef struct _btrie {
        bool valid;
        struct _btrie *children[2];
    }
    btrie;
```

Stacks

```
Pop:
int pop(void)
{
    if (stack.size == 0)
        return -1;
    return stack.numbers[--stack.size];
```

Stacks (cont)

```
}
Push:
bool push(int n)
{
    if (stack.size == CAPACITY || n < 0)
        return false;
    stack.numbers[stack.size++] = n;
    return true;
}
```

Pointers

```
Declaration and initialization:
    int a = 14;
    int b = 15;
    int * iPtr;
    iPtr = &a;
    int * anotherPtr = &b;
Accessing pointers and values:
// assign an address to another pointer
    anotherPtr = iPtr;
// change the value stored in the memory
// location being pointed to
    *iPtr = 3;
// print the address held be a pointer
    printf("%x \n", iPtr);
// print the value being pointed to
    printf("%d \n", *iPtr);
```

&b = "address of" operator
*iPtr = dereference operator
iPtr -> a = 14; //shortcut

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Definitions

Valgrind: used for detecting memory leaks from forgetting to fclose() and free()
- syntax: valgrind –v --leak–check=full <executable file>

Bitwise Operators – see table to the right.
Find if a number is odd: if (num & 1) print(“Odd”);

Hashtable - has 2 main parts: (1) a hash function, and (2) an array the hash function maps to. Often times, each index of the array will be a linked list to store the values that are hashed to a specific index. Struct of a hashtable node is below at left:

Tree - a data structure made up of nodes that have the following 2 rules: (1) A tree node can point at its children or at NULL, and (2) A tree node may not point at any other node other than those listed in (1), including itself. Struct of a 3-child tree is above right. In the diagram, black (top) is the root node and grey (point to NULL) are leave nodes. A binary tree is a special kind of tree that has 2 children left and right.

Trie – Just like tree but can have arbitrary number of children. Below are examples of binary trie and 6-child trie.

File Input / Output

```
Declaring a FILE pointer:
    FILE * inputFile;
    FILE * outputFile;
Opening a file:
    inputFile = fopen("file1.txt",
"r");
    outputFile =
fopen("file2.txt", "w");
Input / Output:
    fscanf(inputFile, "%d", &x);
    fprintf(outputFile, "%f \n",
3.14);
Closing a file:
    fclose(inputFile);
    fclose(outputFile);
```

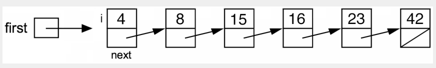
"r" for read
"w" for write
"a" for append

Operators

increment, decrement	++, --
multiply, divide, modulus	*, /, %
add, subtract	+, -
relational comparisons	>, >=, <, <=
equality comparisons	==, !=
and	&&
or	||
assignment	=, +=, -=, *=, /=, %=

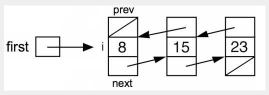
Grouped by precedence.

Linked Lists



Linked list is sorted with NULL pointer after 42.

Doubly Linked List



typedef struct node
{
struct node* prev;
unsigned int i;
struct node* next;
}
node;

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