

Lecture 1 a

Overview

Introduce Yourself



Why we need Data Structure?

Data structure is a particular way of storing and organizing information in a computer so that it can be retrieved and used most productively.

Why we need Data Structure?

Data structures are used in almost every program or software system.

Specific data structures are essential ingredients of many efficient algorithms, and make possible the management of huge amounts of data, such as large integrated collection of databases.

Topics that will be covered

Linked List

Stack

Queue

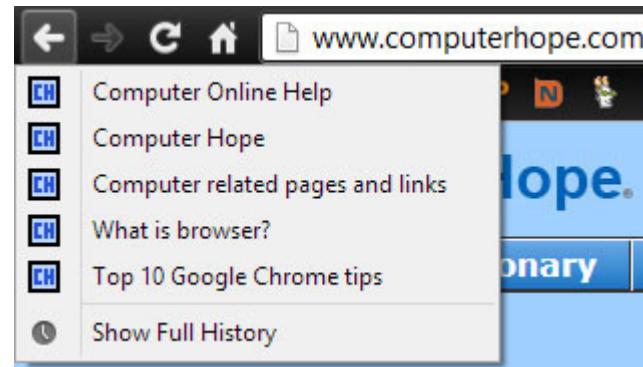
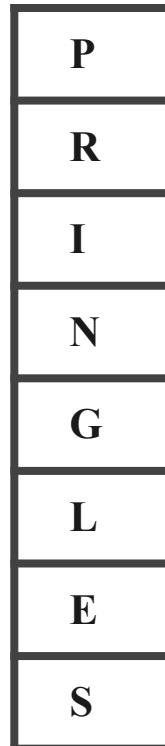
Tree

Graph

Array vs. Linked List



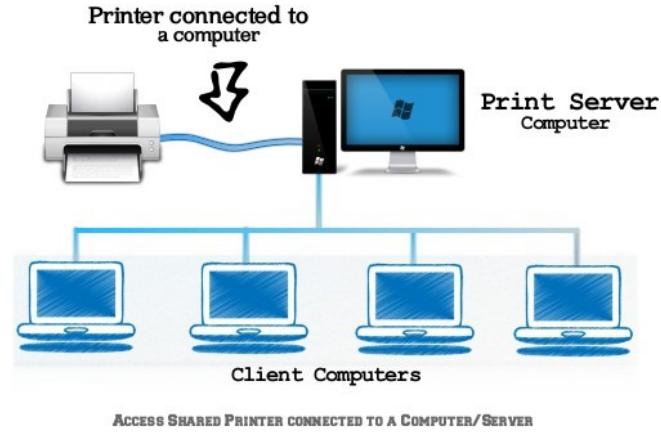
Stack



LIFO - Last In First Out

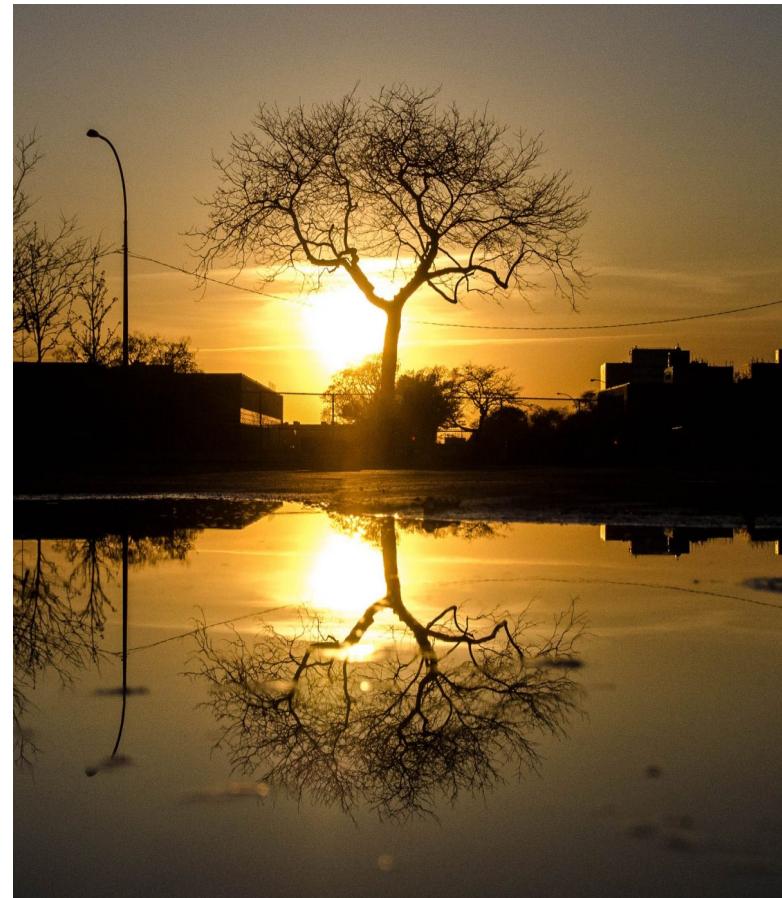
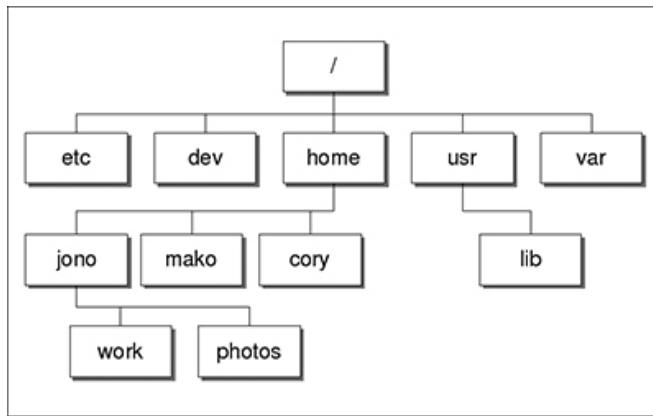
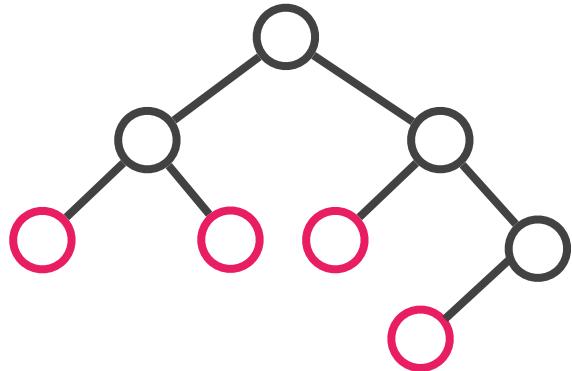
Queue

B	U	S	S	T	O	P
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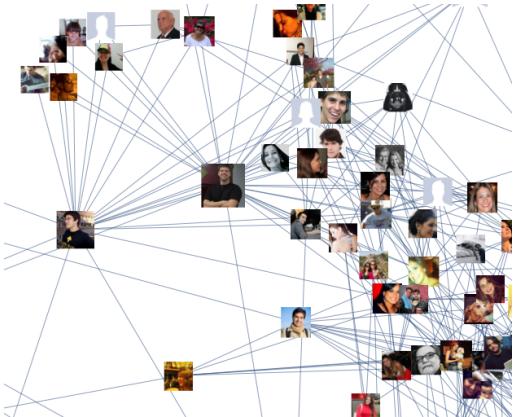
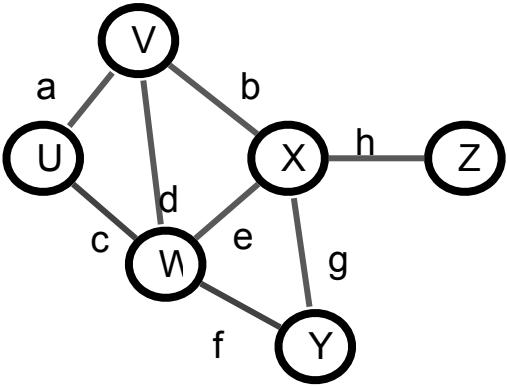


FIFO - First In First Out

Tree



Graph



Dictionary operations

Insert an element

Find an element

Remove an element

Pointers

Pass by value

```
void passByValue(int a){  
    a = 596;  
}
```

```
int main(){  
    int x = 3;  
    passByValue(x);  
    cout << "x is " << x << endl;  
}
```

Memory in a computer RAM(simplified)

Variable Name	Address	Content
a		34
b		56
c		12
...		

Addressing and dereferencing in C++

```
int x = 4;
```

```
cout << &x << endl; //Memory address of x
```

```
int y = &x //Wrong !!
```

```
int *y = &x; //Right ...
```

Addressing and dereferencing in C++

```
int *y = &x; //Getting the address ...
```

```
cout << *y << endl; //Content of y
```

```
cout << y << endl; //Address of x
```

*y = 723; //Right

y = 723 //Wrong

Pass by reference

```
void passByReference(int &a){  
    a = 596;  
}
```

```
int main(){  
    int x = 3;  
    passByReference(x);  
    cout << "x is " << x << endl;  
}
```

Pass by address

```
void passByAddress(int *a){  
    *a = 596;  
}
```

```
int main(){  
    int x = 3;  
    int *y= &x;  
    passByAddress(y);  
    cout<<x<<endl;  
    return 0;  
}
```