

ADTs | List Ordered Collection

Dictionary

Stack
Queue

Priority Queue

Data Structures

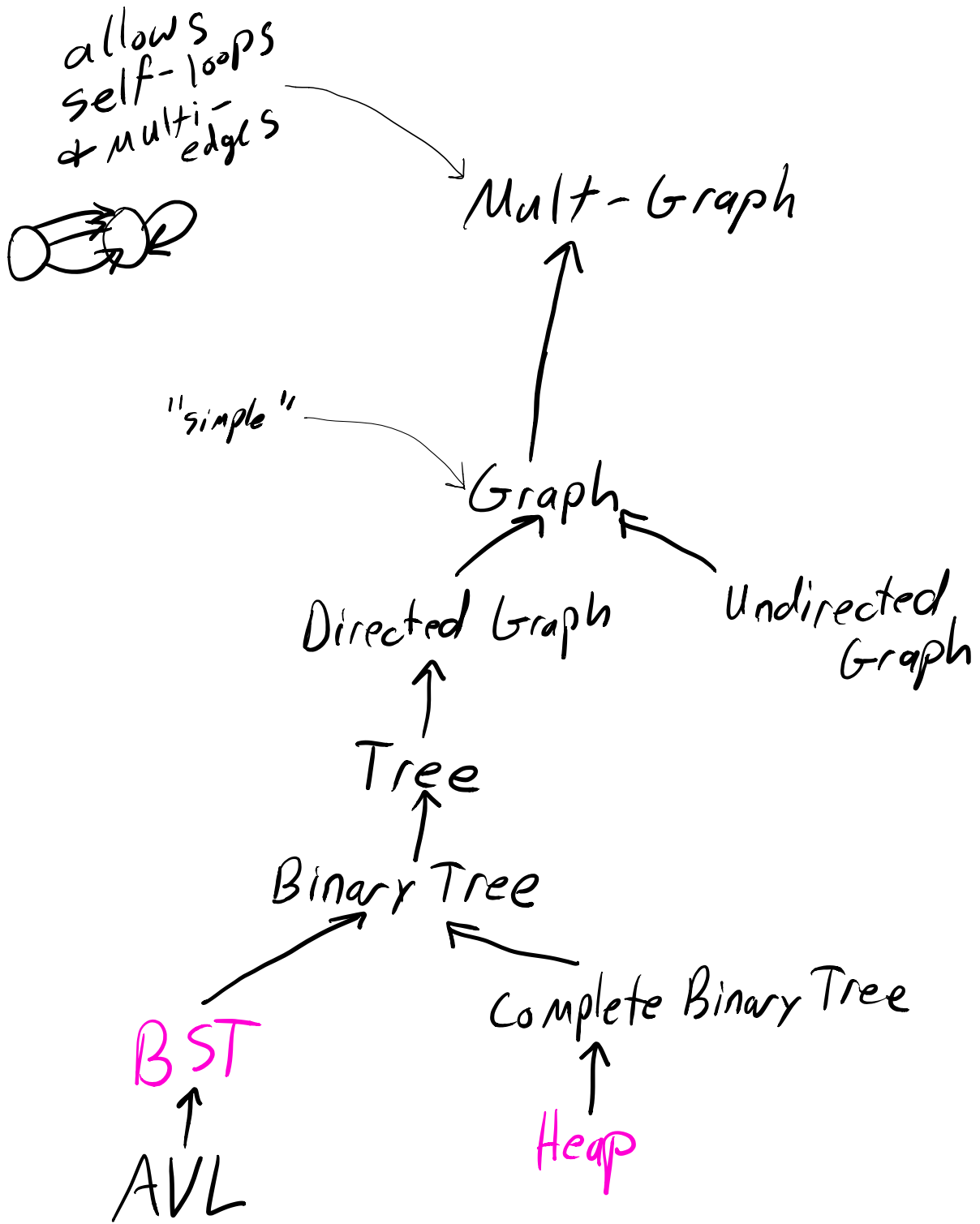
Linked List
Array List

Linked Stack
Linked Queue

BST
AVL

HashTable

Max Heap
Linear Dictionary



Graph = (V, E)

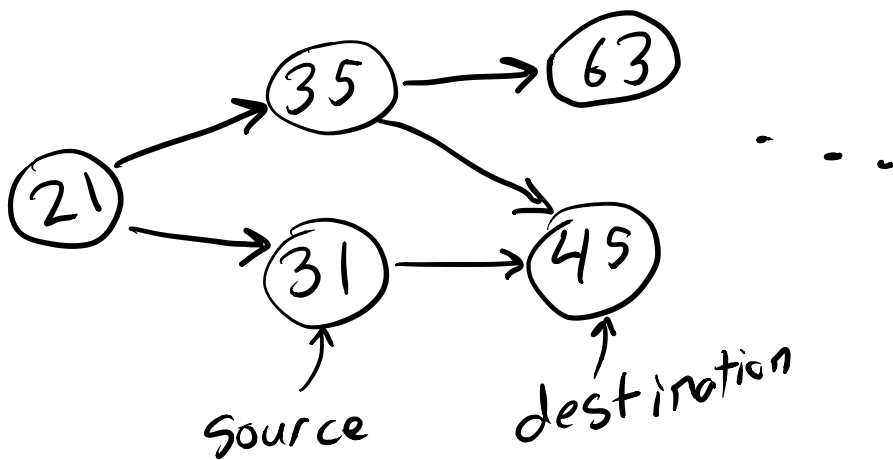
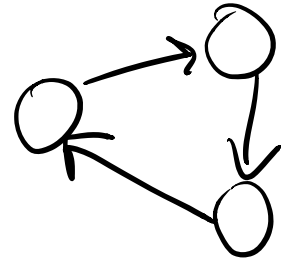
V \equiv set of vertices

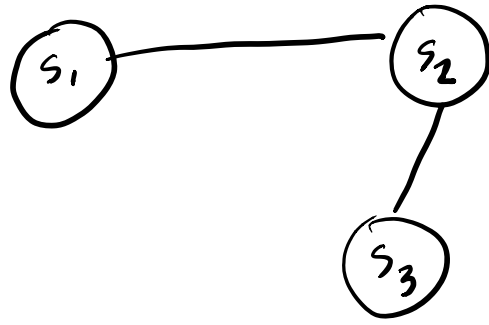
E \equiv set of edges

\hookrightarrow represent relationships among vertices

$\{ (v_1, v_2) \dots \}$

\uparrow edge is a pair of vertices



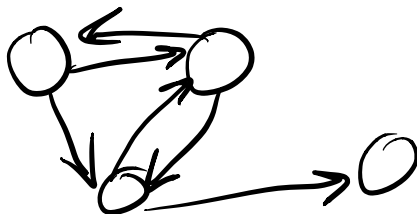


Two types of graph

- Directed \rightarrow edges are ordered pairs
- Undirected \rightarrow edges are pairs

Facebook
(undirected) $V = \{ \text{all users} \}$
 $E = \{ \text{friendships} \}$

Twitter
(directed) $V = \{ \text{all users} \}$
 $E = \{ \text{follow relations} \}$



Graph Examples:

Road Map

Geographic Map

Co-authorship

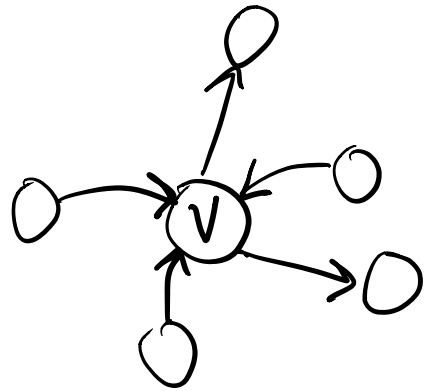
Family Tree

edge weight
(maybe a number)

edge label
(maybe a string)

A tree is a directed graph where all vertices have in-degree at most 1. And only one vertex has in-degree 0.

The in-degree of a vertex v is the number of edges (u, v) where v is the destination.



indeg = 2
outdeg = 3

The out-degree of a vertex v is the number of edges (v, u) where v is the source.

Undirected: degree # edges for v

Functions:

is Connected (v_1, v_2)

shortest Path (v_1, v_2)

- number of edges

min Weight Path (v_1, v_2)

- total weight of edges