Don't wanna be a wannabe
But be a bee. Just simply be.

J. Simplee Bee

Graphs

Yeah! Since this is the lastest quest of this level, it is also gonna be the funnest quest.

You get to implement a simple Graph data structure with a WHOLE LOT OF freedom around how you do it.

All you have to do in this quest is to make various shapes. I don't care how you make them as long as you make them correctly.

Pick and choose. Each shape is worth a certain number of rewards. Generally, the simpler ones are also cheaper and easier to get.

But before you get to it, here's the representation I'll be looking for:

```
class Graph {
protected:
    struct Edge {
        int _dst;
        std::string _tag;
        Edge(int dst = -1, std::string tag = "") : _dst(dst), _tag(tag) {}
    };
    std::vector<std::vector<Edge> > _nodes;

    // Suggested private helpers. Not tested.
    void add_edge(int src, int dst, std::string tag);
    std::string to_string() const;

public:
    void make_silly_snake();
    void make_mr_sticky();
    void make_driftin_dragonfly();
    void make_slinky_star();
    void make_kathy_da_grate();
    void make_dodos_in_space();
    void make_purty_pitcher();

    friend class Tests; // Don't remove this line.
};
```

We're keeping everything as simple as possible so you can focus on your visual art in this quest. Our Graph nodes only have numbers, not names. Edges from one node to another may have optional string tags you can stick on them.

This lets us model the graph as a collection of *nodes* which each contain a collection of *edge*s.

This is it:

```
      std::vector<std::vector<Edge> > g;
```

where the entire graph is simply the collection of nodes, called `g` above. In this case, we're using `vectors` for collections.

Important: The graph is NOT a 2D matrix. It is a vector of nodes, where each node contains a vector of edges. Nodes that don't have edges leaving them will be represented by the cells that hold empty vectors. Put another way, the edge from node A to node B can be found in the vector located at `g[A]`. But that edge is NOT `g[A][B]`. Instead you must scan this inner vector to find the edge with the destination of interest.

If you think about it, the Edge object is already an added level of complexity that serves only a cosmetic purpose. We could have made the inner vector a vector of ints, where the ints stand for the destination nodes, and thereby kept things much simpler (We'd still get our shapes).

The reason I have it is to give me a way to stick a label on each edge. I thought it'd be cool. I'll revisit this decision later. For now, it's needed to pass this quest.

Note the golden comment in the starter code. The suggested helper methods are NOT tested. The only methods you need to implement are the public ones, described below in the miniquests. Feel free to implement or not implement the suggested helpers, or implement as many more as you want.

The only thing the miniquests will be looking for is whether your Graph object looks like what it's looking for (in hyper-space, of course. No serialization required).

See I told you it's gonna be fun.

Your first optional miniquest - The Silly Snake

Implement:

```
void Graph::make_silly_snake();
```

When invoked, it should clear itself and be reborn as a silly snake. See Figure 1.

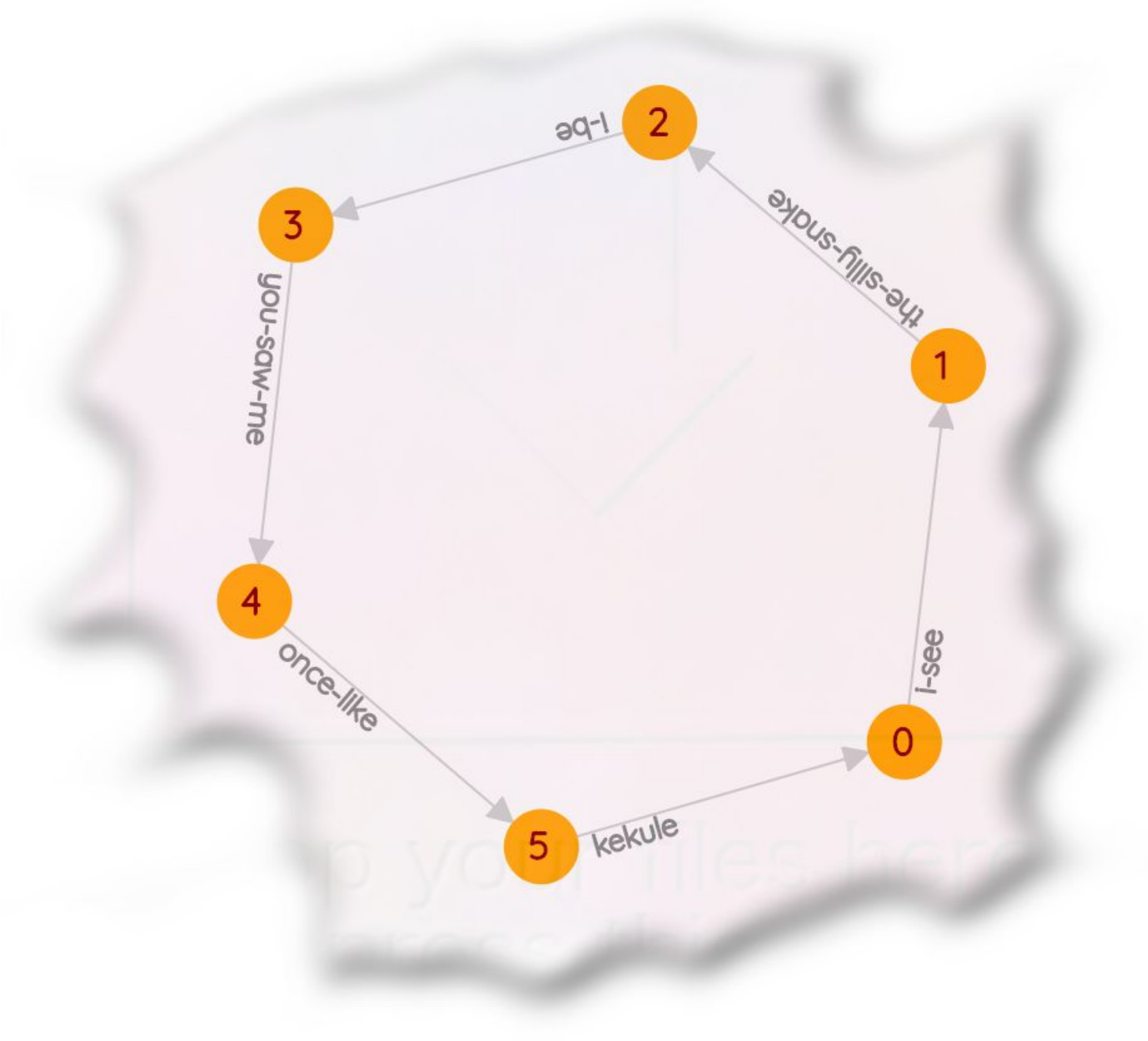


Figure 1: Silly Snake

Make sure to get the edge labels correct.

Your second optional miniquest - Mr Sticky

Implement:

```
    void Graph::make_mr_sticky();
```

When invoked, it should clear itself and be reborn as a mr sticky. See Figure 2.

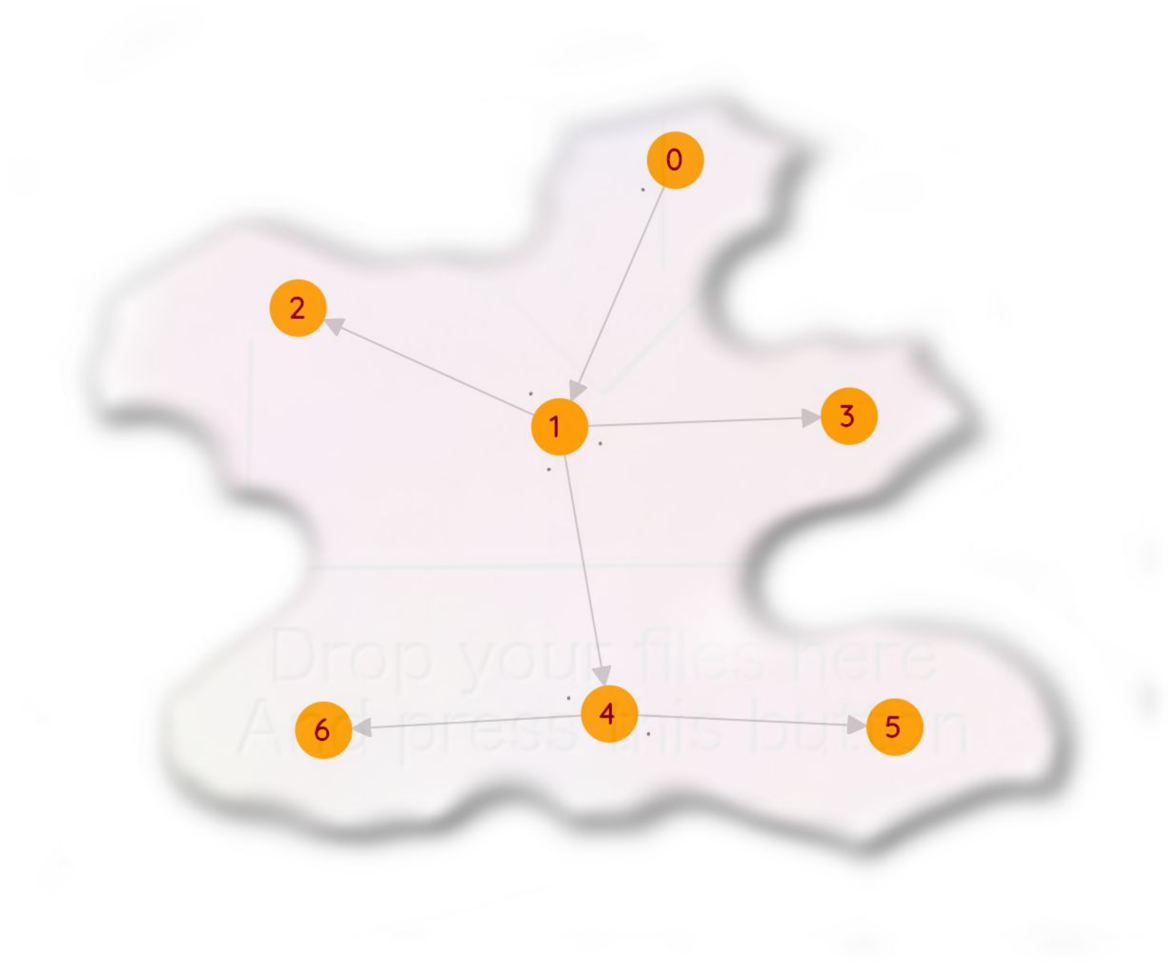


Figure 2: Happy Mr Sticky

What are the edge labels here?

Hmmm... I can't quite tell. Is that a period?

Or a hyphen?

Oh well, there's only 64 possibilities (or is it 729?)

Your third optional miniquest - The Driftin Dragonfly

Implement:

```
    void Graph::make_driftin_dragonfly();
```

When invoked, it should clear itself and be reborn as a driftin dragonfly. See Figure 3.

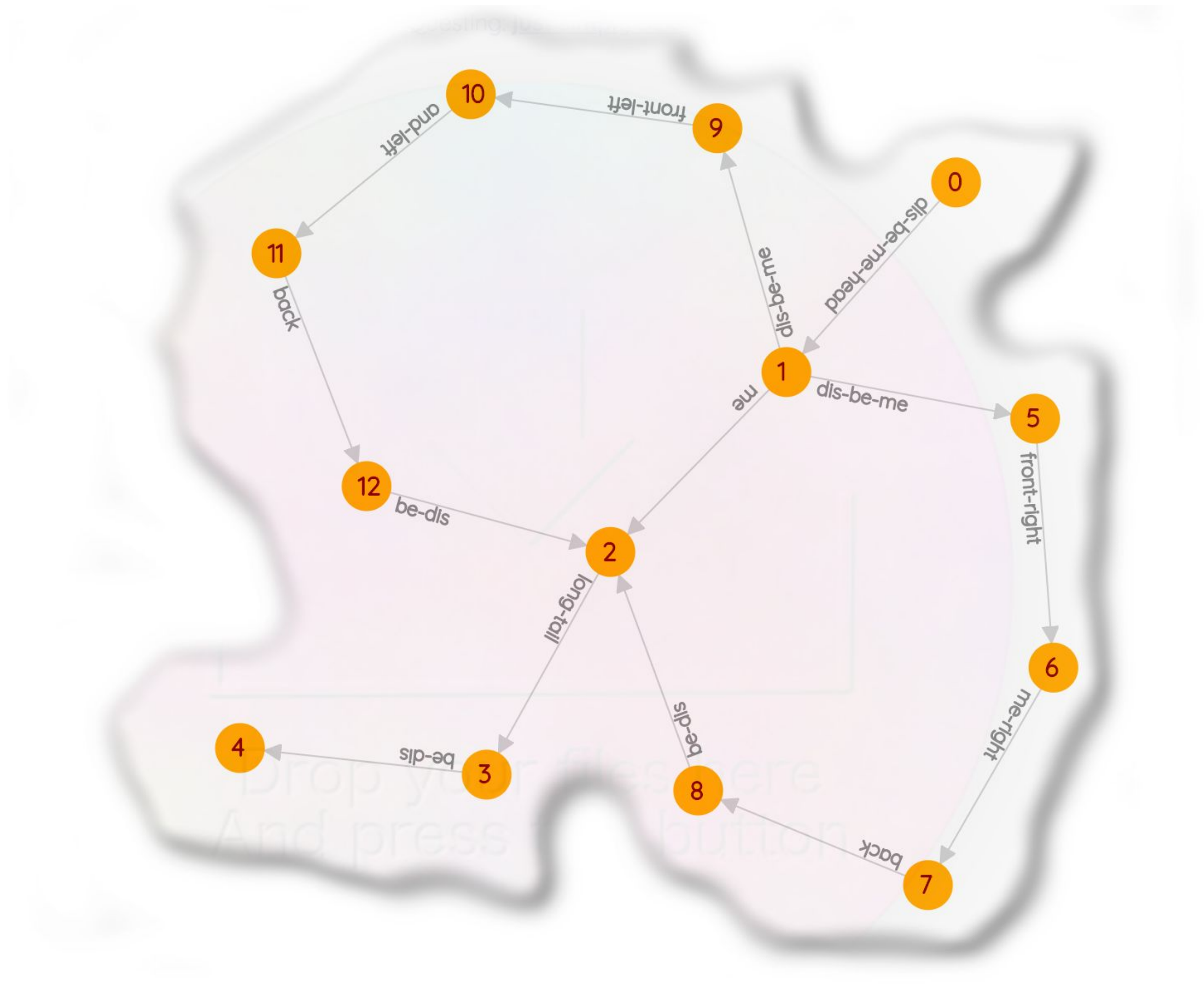


Figure 3: The Driftin Dragonfly

Again, make sure you get the edge labels right, or your dragon don't fly.

Your fourth optional miniquest - The Slinky Star

Implement:

```
void Graph::make_slinky_star();
```

When invoked, it should clear itself and be reborn as a slinky star. See Figure 4.

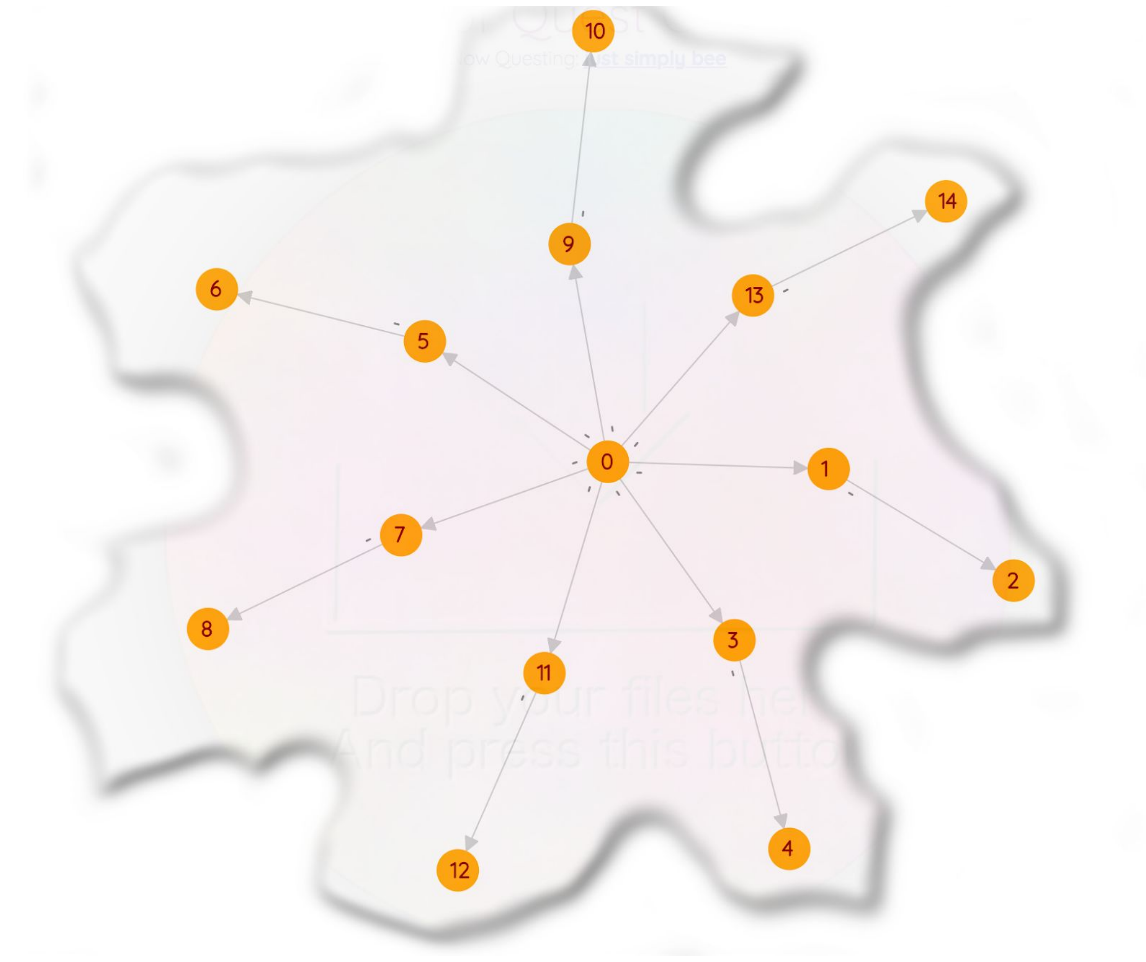


Figure 4: The Slinky Star

A star you are. A star you be,

Your fifth optional miniquest - Kathy da grate

Implement:

```
    void Graph::make_kathy_da_grate();
```

When invoked, it should clear itself and be reborn as Kathy da Grate. See Figure 5.

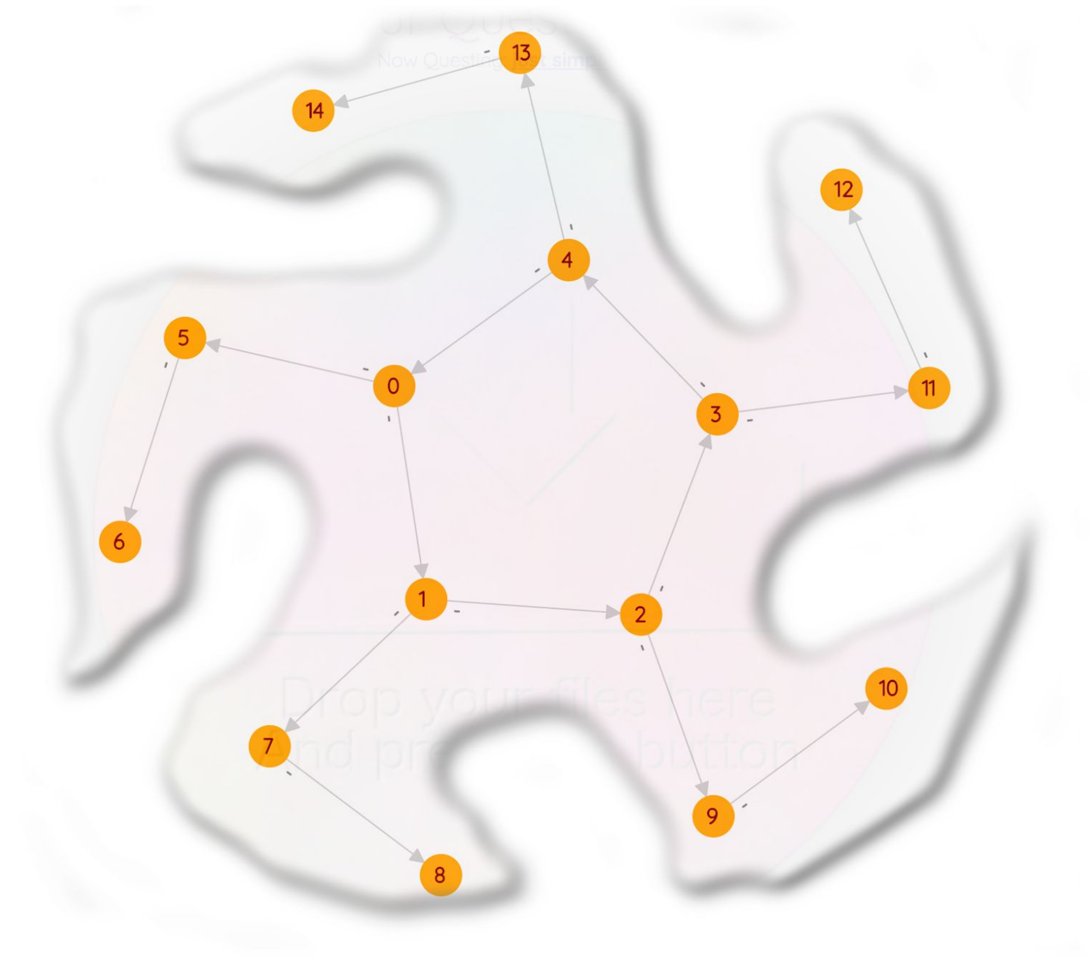
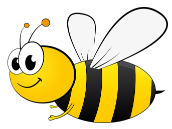


Figure 5: Kathy da Grate



Your sixth optional miniquest - Dodos in space

Implement:

```
void Graph::make_dodos_in_space();
```

When invoked, it should clear itself and be reborn as 25 dodos in space.

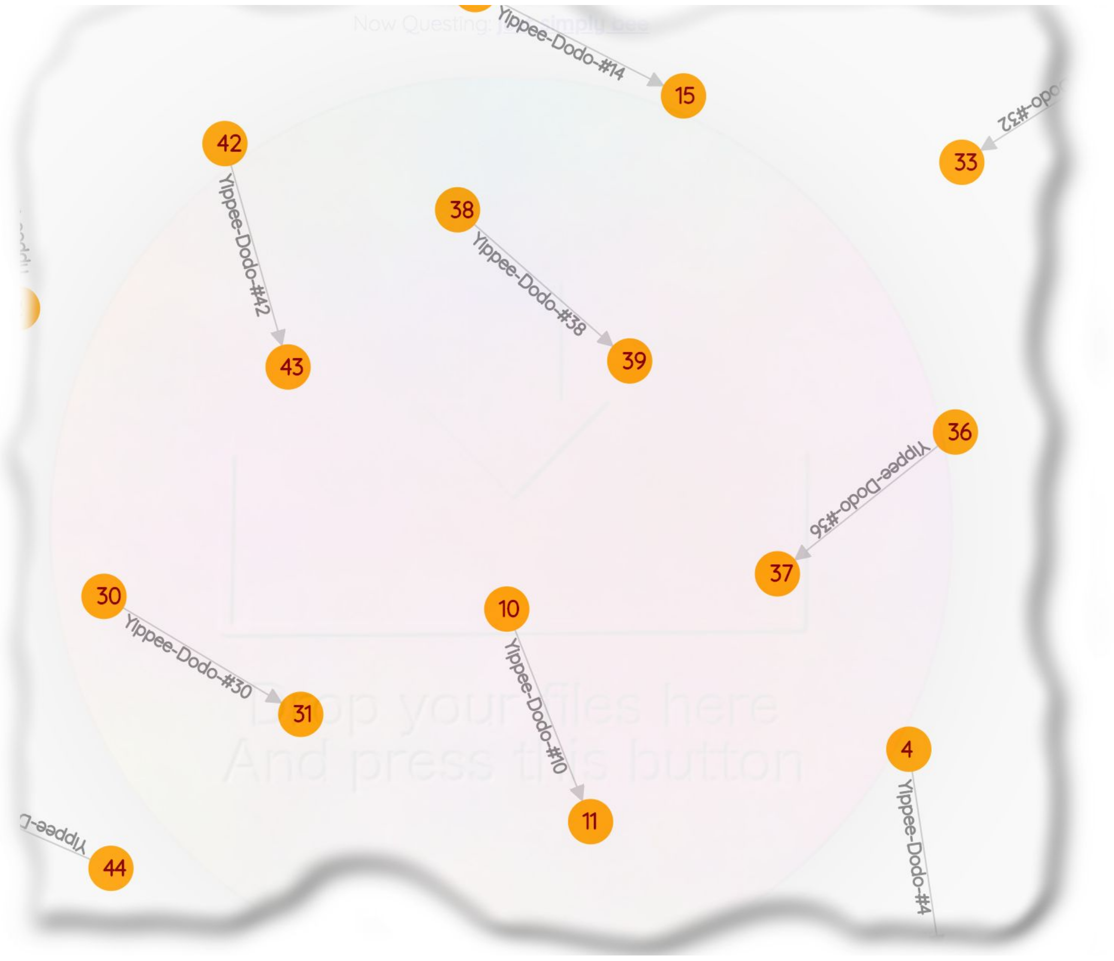


Figure 6: Dodos in space (Warning: Only a representation of reality. Verify your own numbering)

Each dodo is an even numbered node which points to the next odd numbered node via an edge that is tagged '`Yippee-Dodo-#`' post-fixed with the dodo's node number.

There should be 25 free dodos in your graph. See Figure 6.

The first dodo is numbered #0 and the rest are sequentially numbered after that.

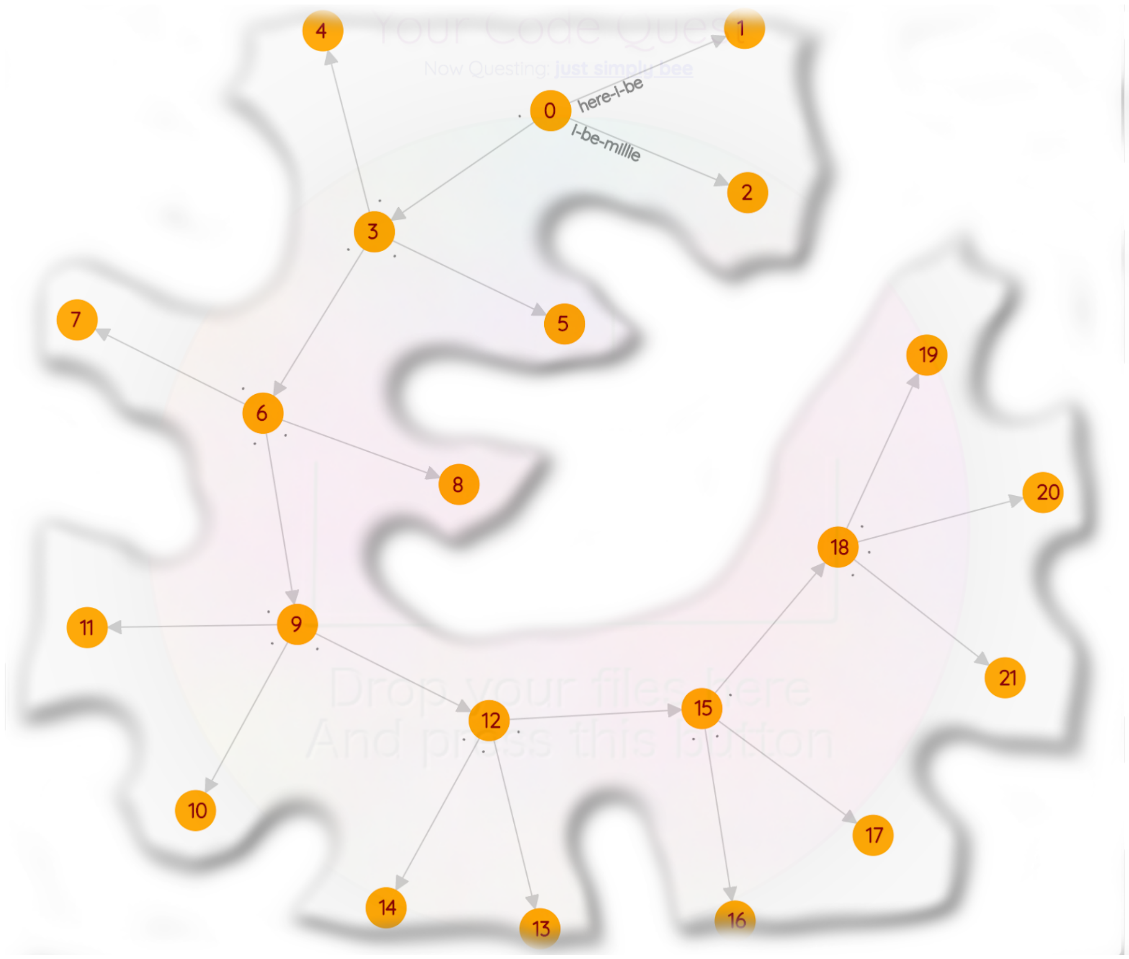
Your seventh optional miniquest - Purty Pitcher

Implement

```
    void Graph::make_purty_pitcher();
```

It can make any graph you want. If it's purty nuff, upvotes on our subreddit earn extra credit rewards.

Here's mine. Yours don't have to be like dis.



Knock yerselves out.

Submission

When you think you're happy with your code and it passes all your own tests…

What am I talkin' about? It's party time. Enjoy your break.

Hopefully you now have the time to be coding *more always than before*.

And if you're ever bored, you can

1. head right over to over to https://quests.nonlinearmedia.org
2. enter the secret code for this quest in the box.
1. drag and drop your `source` files (`Graph.*`) into the button and press it.
2. wait for me to complete my tests and report back (usually a minute or less).

Byeee!

Thank you for enjoying the flight with me. I look forward to flying with you again!

Happy hacking,

&