NODES CONCEPTUAL I

Nodes Introduction

Nodes are the fundamental building blocks of many computer science data structures. They form the basis for linked lists, stacks, queues, trees, and more.

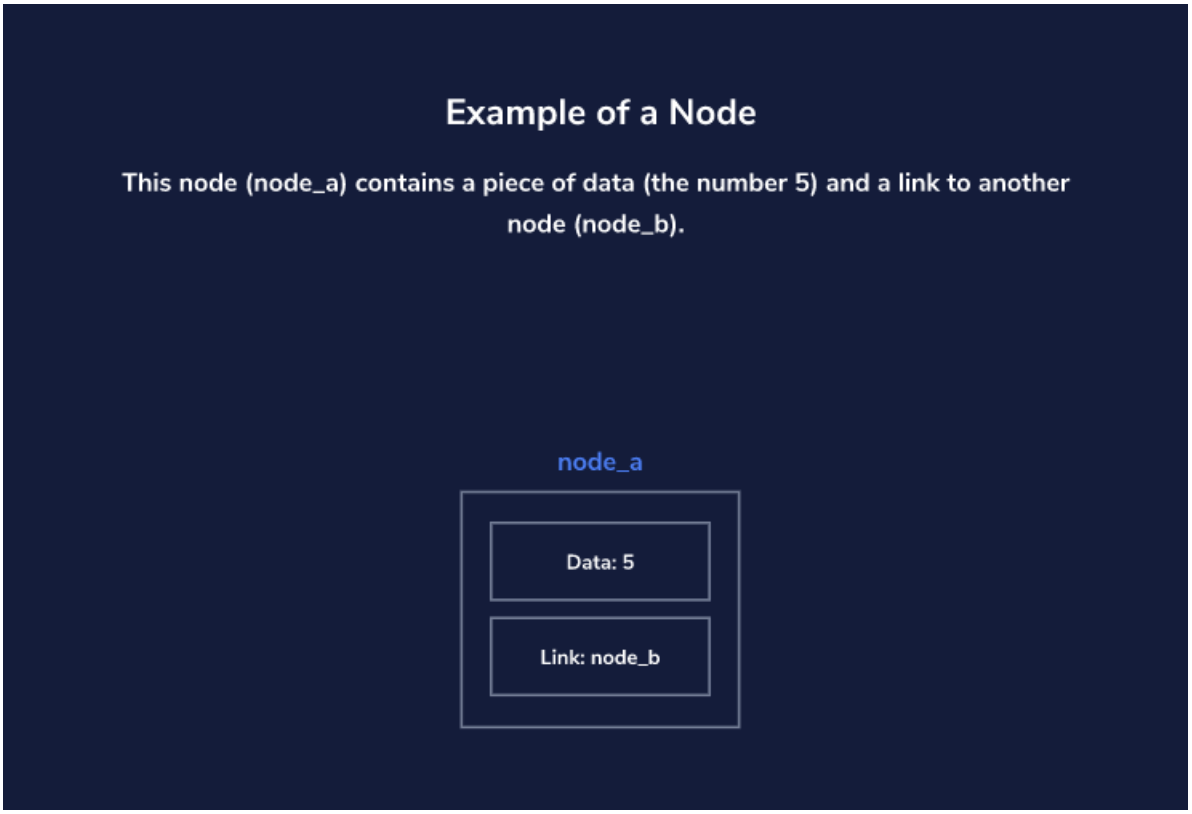
An individual node contains data and links to other nodes. Each data structure adds additional constraints or behavior to these features to create the desired structure.

Consider the node depicted in the pane to the right. This node (`node_a`) contains a piece of data (the number `5`) and a link to another node (`node_b`).

Instructions

Why do you think Nodes are so common?

What do they add that isn't built-in to a language?



Nodes Detail

The data contained within a node can be a variety of types, depending on the language you are using. In the previous example, it was an integer (the number `5`), but it could be a string (`"five"`), decimal (`5.1`), an array (`[5,3,4]`) or nothing (`null`).

The link or links within the node are sometimes referred to as *pointers*. This is because they "point" to another node.

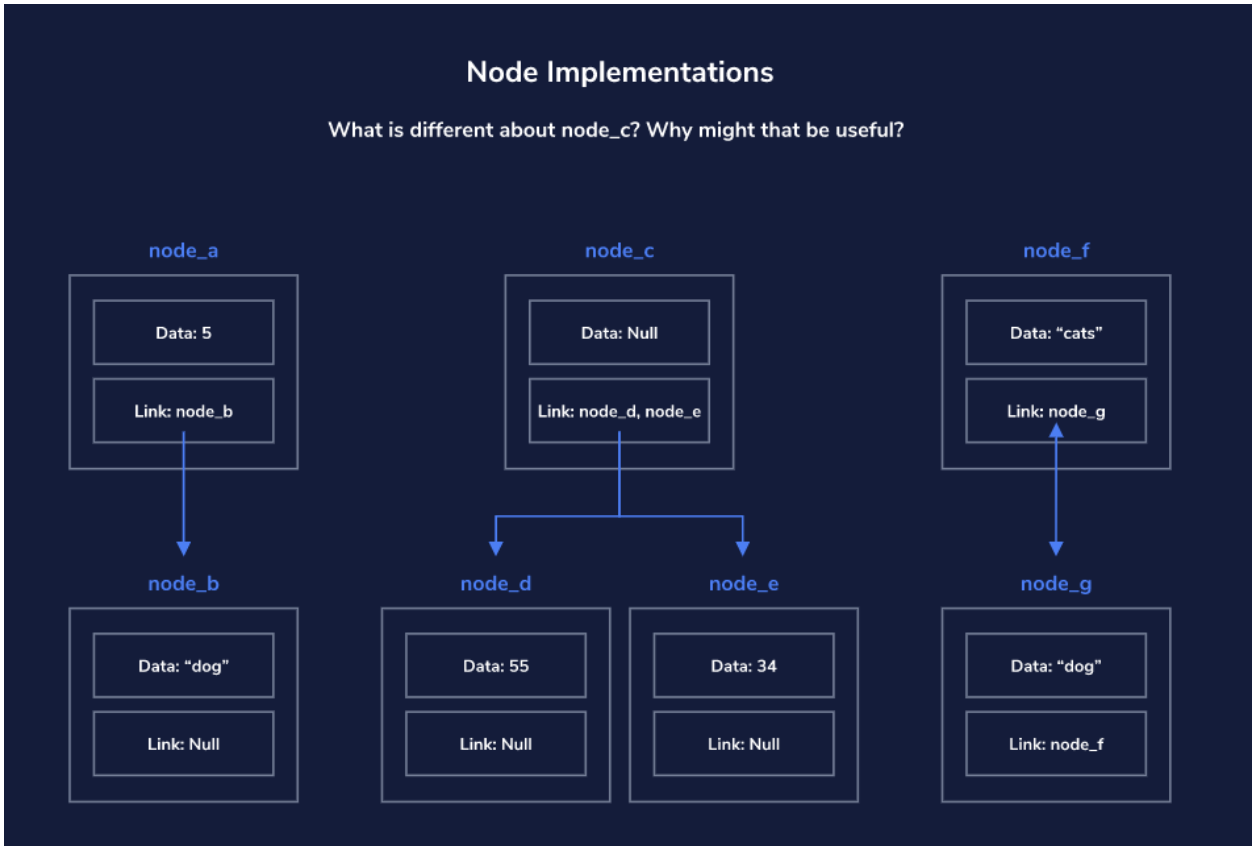
Typically, data structures implement nodes with one or more links. If these links are `null`, it denotes that you have reached the end of the particular node or link path you were previously following.

A variety of node implementations are depicted in the diagram. Examine the types of data and how some of the nodes are linked.

Instructions

What is different about `node_c`?

Why might that be useful?



Node Linking

Often, due to the data structure, nodes may only be linked to from a single other node. This makes it very important to consider how you implement modifying or removing nodes from a data structure.

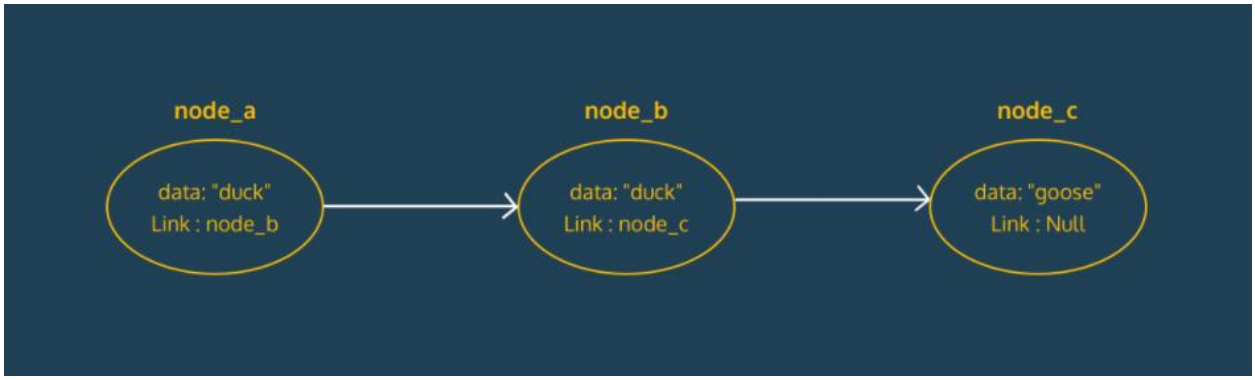
If you inadvertently remove the single link to a node, that node's data and any linked nodes could be "lost" to your application. When this happens to a node, it is called an *orphaned* node.

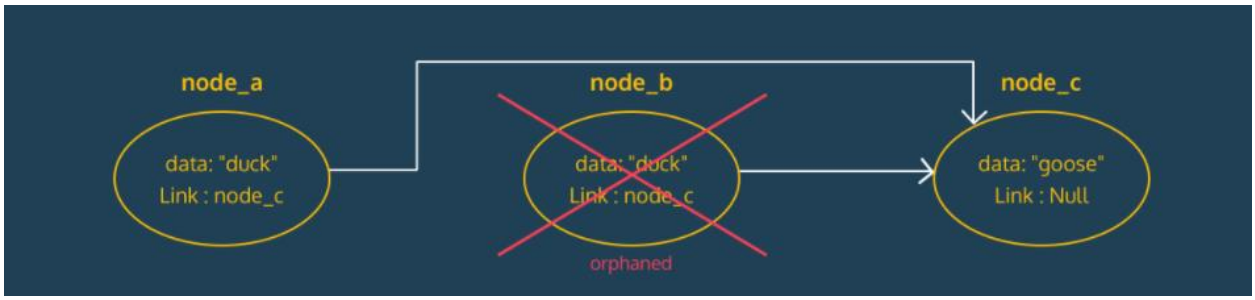
Examine the nodes in the diagram. `node_c` is only linked to by `node_b`. If you would like to remove `node_b` but not `node_c`, you can't simply delete the link from `node_a` to `node_b`.

The most straightforward method to preserve `node_c` would be to change the link in `node_a` to point to `node_c` instead of `node_b`. However, some data structures may handle this in a different manner.

Instructions

Is it necessary to "delete" `node_b` if we change `node_a` to reference `node_c` instead?





Nodes Review

Let's take a minute to review what we've covered about nodes in this lesson.

Nodes:

- Contain data, which can be a variety of data types
- Contain links to other nodes. If a node has no links, or they are all `null`, you have reached the end of the path you were following.
- Can be orphaned if there are no existing links to them