
Section 1

1.

1. Test cases help you to establish the scope and functionality of your code, and force you to consider what your desired output is in positive, edge, corner and negative cases. This results in more comprehensive and robust programs.
2. Establishing tests cases allows you to automate them in test scripts. It is then easy and test to retest your code against all possibilities throughout the development and if changes are made.
3. Clear test cases can help to communicate the functionality of a module to other members of a team, facilitating collaboration.

2.

Mocks are a tool used mainly in unit testing. They are code written to imitate the behaviour of something that interacts with the main module being tested. They can be used if other modules haven't been written yet, or the system will eventually interact with something external like a database or sensors. ("Mock object", 2020) (Liversage, M. 2010)

Advantages	Disadvantages
Mocks facilitate testing throughout development. If you don't have to wait for every single interacting element to be done to test, you can pick up errors earlier, when they are easier to fix.	Mocks, when not thoroughly created, may not account for the full span of behaviour of its real counterpart. This may cause a module that has been tested to not be equipped to deal with real conditions.
Mock objects allow for the effective isolation of a module when tested. Any errors that occur can be found and fixed in the module at hand, and don't have to be traced to their origin elsewhere. ("What are Mock Objects?", 2020)	When a module is interacting with very complex systems, the time it takes to thoroughly set up a mock may outweigh its convenience for testing other modules. ("Mock Objects: Friends Or Foes? – Games from Within", 2010)

3.

In 2014, Nissan recalled almost 1 million vehicles due to a bug involving airbags deployment. US Federal regulation mandated that vehicles should sense if the front passenger seat was empty or had a small child in it, and turn off the air bag accordingly. Nissan stated their sensors were not accurate in situations including "high engine vibration at idle when the seat is initially empty and then becomes occupied". This indicates they did not complete sufficient testing on this system, and their code determining the point at which the air bags should be toggled was inadequate. At the time that Nissan recalled the vehicles, they were aware of 3 accidents where the air bag did not deploy when it should have, but no fatalities. (Jensen, 2014)

Section 2

1.

The BFS algorithm is faster at finding a path if the end is close to the starting cell. It also inherently finds the optimal route first (i.e. before it has found any other possible winning paths) by checking all immediate neighbours, then paths with one more step etc. If finding the optimal route was important, BFS would be the one to use.

2.
The DFS algorithm finds a route before the BFS algorithm when the ending cell isn't very close to the beginning. That being said, this is not necessarily the most efficient route (See figure 1 orange). Therefore, it would be best used in a situation where finding the optimal path isn't necessary.

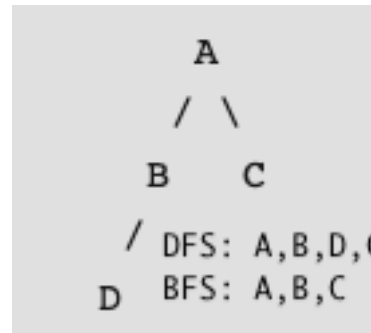
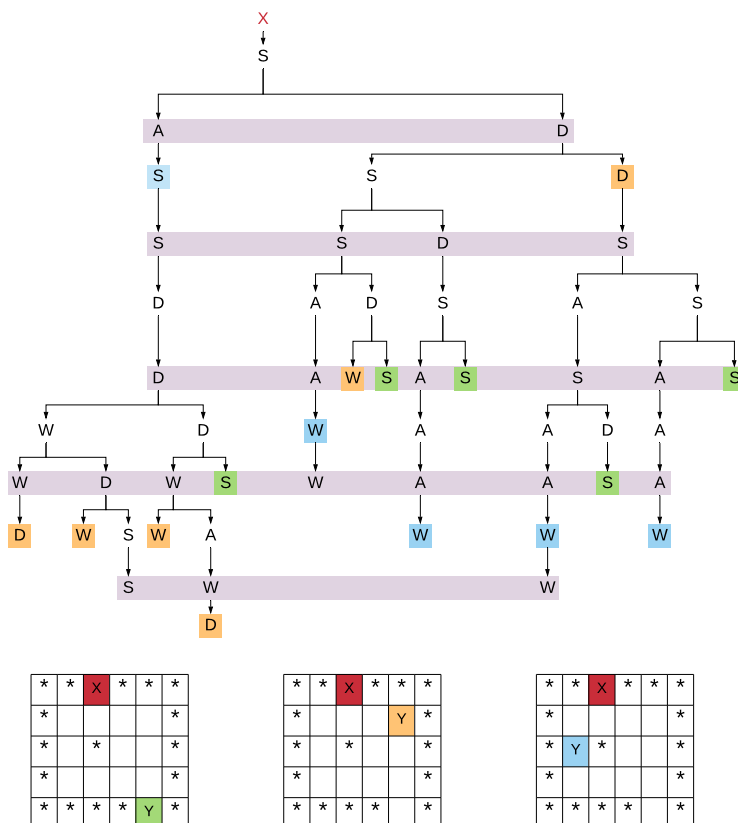


Figure 2 - ("Difference Between BFS and DFS - GeeksforGeeks", n.d.)

Figure 3 - board_hard.txt

3.
No. Take Figure 2 - Say the ending cell was at C, very close to the starting cell. DFS would first go all the way down the B branch, where BFS would check its immediate neighbours first.

4.
The water/fire feature prevents you from using a standard visited cells list. Take board_hard.txt (Figure 3) for an example. To win you must use the water to get to the end. The water bucket is down a dead end, and you must backtrack to win the game.



DFS	BFS
S	S
SA	SA
SAS	SD
SASS	SAS
SASSD	SDS
SASSDD	SDD
SASSDDW	SASS
SASSDDWW	SDSS
SASSDDWWW	SDSD
SASSDDWWD	SDDS
SASSDDWD	SASSD
SASSDDWDS	SDSSA
SASSDDWDSS	SDSSD
SASSDDDD	SDSSS
SASSDDDW	SDDSA
SASSDDDDW	SDDSS
SASSDDDDWA	SASSDD
SASSDDDDWAW	SDSSAA
SASSDDDDWAWD	SDDSDW
SASSDDDDWS	SDDSDS
SD	SDSSDS
SDS	SDSSDSA
SDSS	SDDSDSS
SDSSA	SDDSSAS
SDSSAA	SDDSSAA
SDSSAAW	SDDSSS
SDSSAAWW	SASSDDW
SDSSD	SASSDDD
SDSSDW	SDSSAAW
SDSSDS	SDSSDSAA
SDSD	SDDSSASA
SDSDS	SDDSSAD
SDSDSA	SDDSSAA
SDSDSAA	SASSDDWW
SDSDSAAA	SASSDDWD
SDSDSAAAW	SASSDDDW
SDSDSAAAWW	SASSDDWDS
SDSDASD	SASSDDWW
SDSDASDS	SASSDDWA
SDSDSA	SDSDSAAW
SDSDSAA	SDDSSAAW
SDSDSAAA	SDDSSAAW
SDSDSAAAW	SASSDDWDS
SDSDSAAAWW	SASSDDWAW
	SDDSSAAWW
	SASSDDWAWD

Figure 1 - worked example of DFS and BFS traversals

References

- Difference Between BFS and DFS - GeeksforGeeks. Retrieved 29 May 2020, from <https://www.geeksforgeeks.org/difference-between-bfs-and-dfs/>
- Jensen, C. (2014). Nissan Recalls 990,000 Vehicles for Air Bag Malfunction. New York Times. Retrieved from <https://www.nytimes.com/2014/03/27/automobiles/nissan-recalls-990000-cars-and-trucks-for-air-bag-malfunction.html>
- Liversage, M. (2010, April 19). What is Mocking? [Online Forum Post]. Message posted to <https://stackoverflow.com/questions/2665812/what-is-mocking>
- Mock object. (2020). Retrieved 24 May 2020, from https://en.wikipedia.org/wiki/Mock_object
- Mock Objects: Friends Or Foes? – Games from Within. (2010). Retrieved 24 May 2020, from <http://gamesfromwithin.com/mock-objects-friends-or-foes>
- What are Mock Objects?. (2020). Retrieved 24 May 2020, from [https://www.agilealliance.org/glossary/mocks/#q=~\(infinite~false~filters~\(postType~\(~'page~'post~'aa_book~'aa_event_session~'aa_experience_report~'aa_glossary~'aa_research_paper~'aa_video\)~tags~\(~'mock*20objects\)\)~searchTerm~'~sort~false~sortDirection~'asc~page~1\)](https://www.agilealliance.org/glossary/mocks/#q=~(infinite~false~filters~(postType~(~'page~'post~'aa_book~'aa_event_session~'aa_experience_report~'aa_glossary~'aa_research_paper~'aa_video)~tags~(~'mock*20objects))~searchTerm~'~sort~false~sortDirection~'asc~page~1))