



Abstraction

Lesson Objectives



At the end of this lesson, you should be able to:

- Describe the concept of abstraction
- Explain the importance of abstraction

Topic Outline



What is Abstraction?



Why is Abstraction Important?



Algorithm Abstraction and Data Abstraction

What is Abstraction?

Abstraction

- **simplifies** things
- identifies what is **important** without worrying too much about the detail
- allows us to **manage complexity**

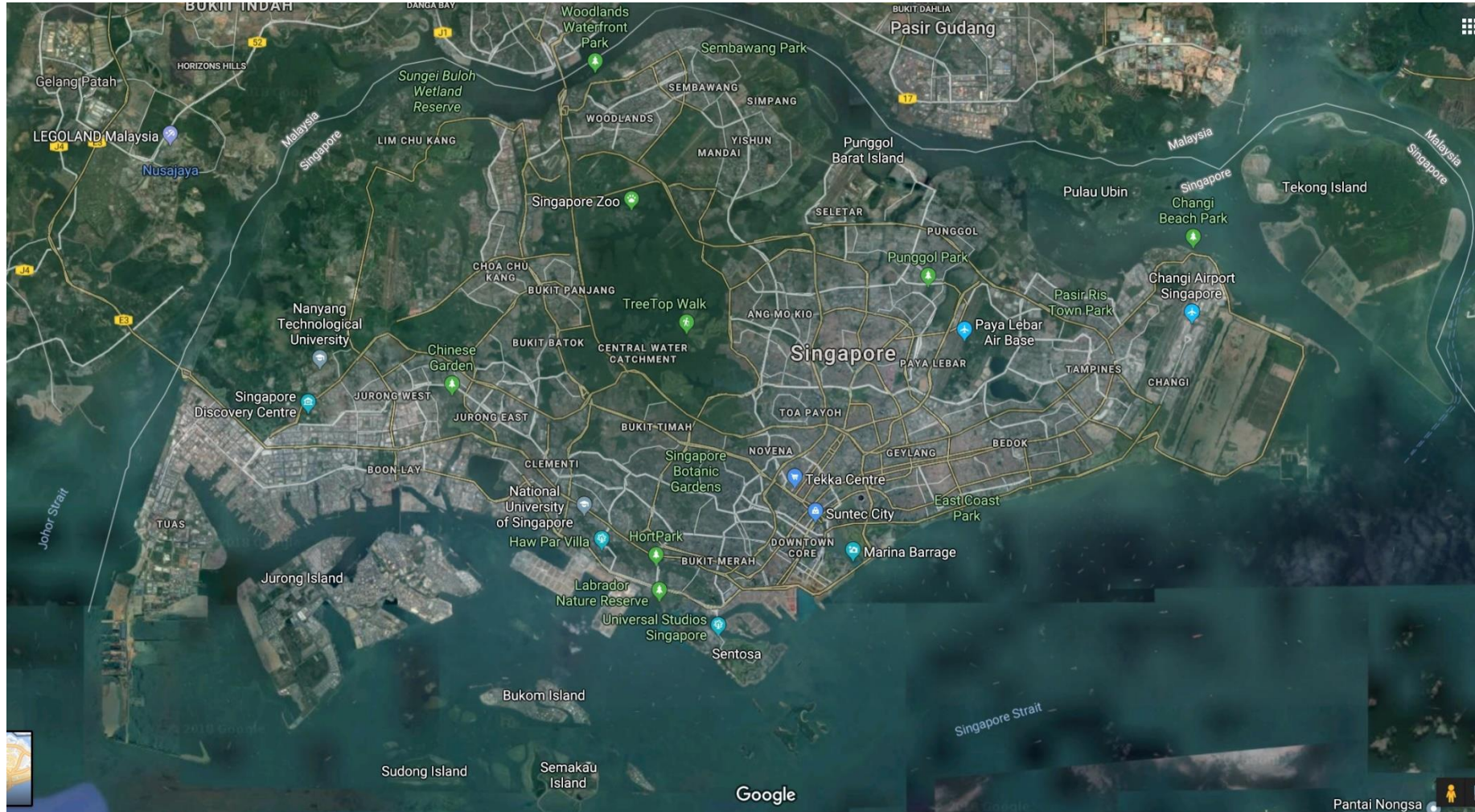
What is Abstraction? (Cont'd)



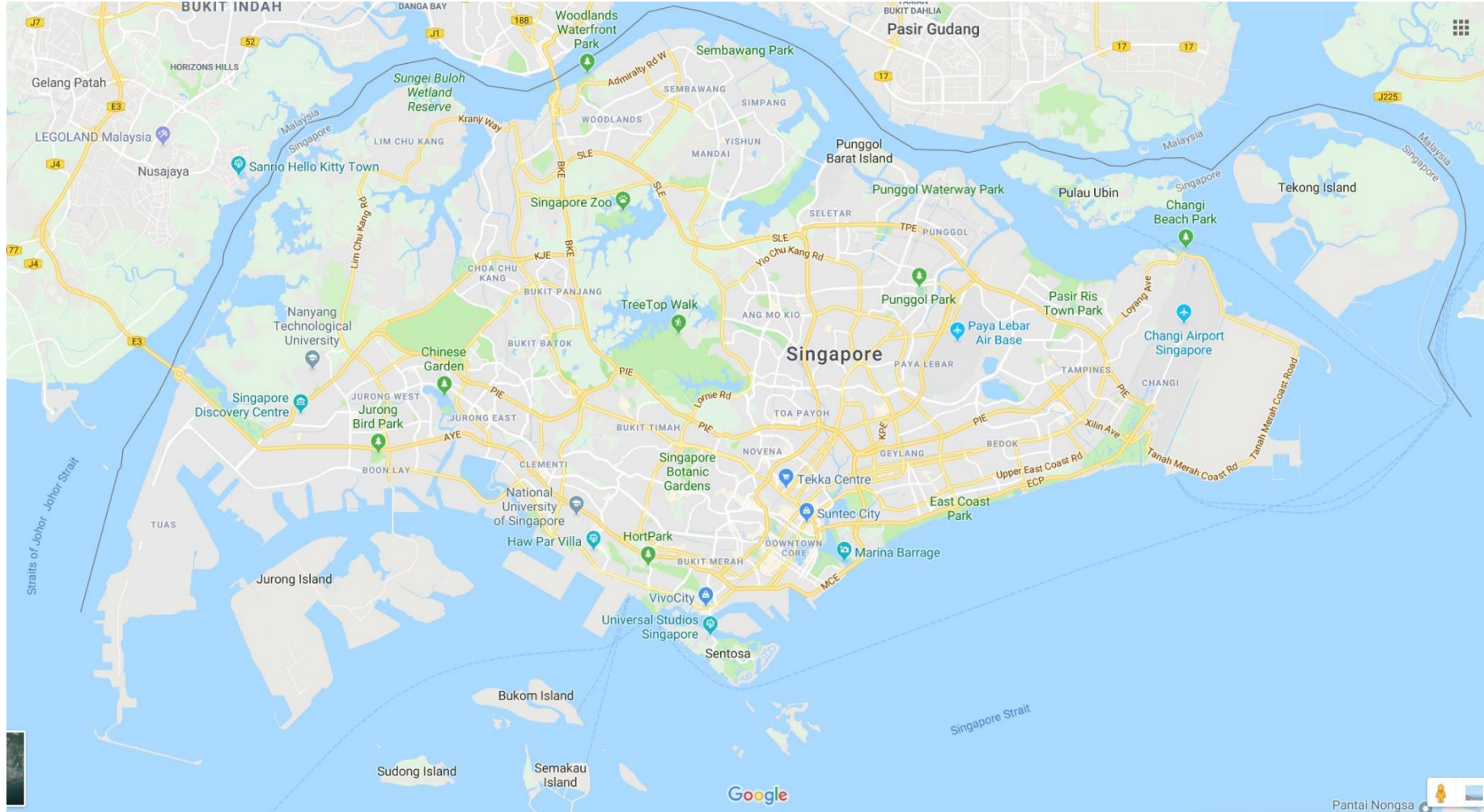
“The abstraction process - deciding what details we need to highlight and what details we can ignore - underlies computational thinking”.

Jeannette Wing, 2008

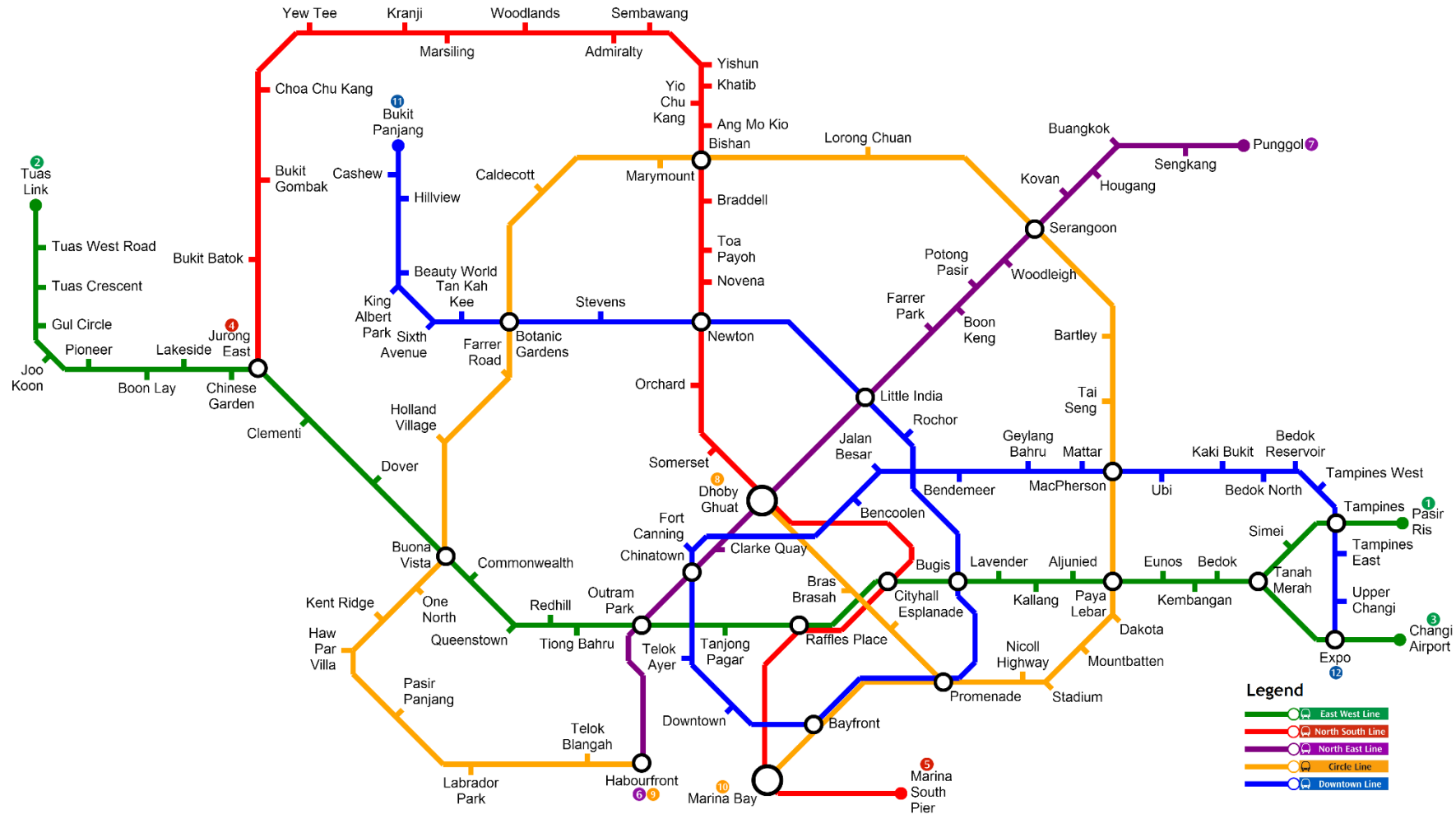
Abstraction Example



Abstraction Example (Cont'd)



Abstraction Example (Cont'd)



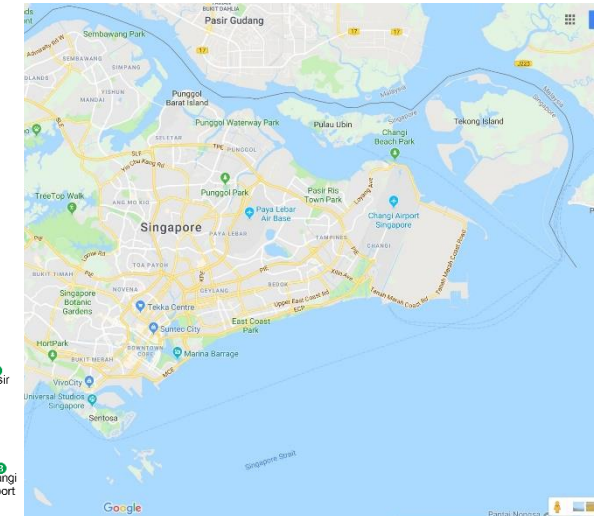
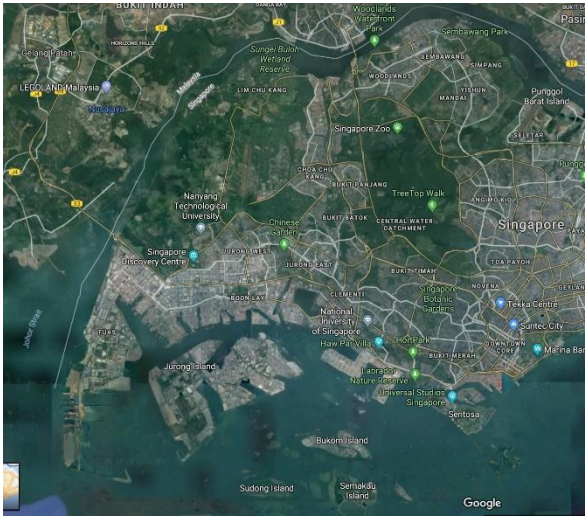
Why is Abstraction Important?

- A key element of computing is the complexity of the systems we build.
- **Abstraction** provides a means to distil what is essential, giving a manageable approach to create computational solutions.
- **Abstractions** are sometimes represented as **layers** or **hierarchies**, allowing us to view things at different degrees of detail.

Example

How many MRT stations are there in Singapore?

Which abstraction do you want to use?



Abstraction in Data: **Data Structures**
(Strings, Lists, Tuples, Dictionaries, etc.)



Programs = Algorithms + Data Structures






(1976, Niklaus Wirth)

Abstraction in Algorithms:
Functions

In this lesson, we have learned:

- What Abstraction is
- The Importance of Abstraction

References for Images

No.	Slide No.	Image	Reference
1	6		By World Economic Forum - Flickr: An insight, an idea: Jeannette Wing, CC BY-SA 2.0, retrieved June 25, 2018 from https://commons.wikimedia.org/w/index.php?curid=24229759
2	7, 11		Map of Singapore. Retrieved June 22, 2018 from Google Earth. US Dept of State Geographer Data SIO, NOAA, U.S. Navy, NGA GEBCO ©2018 Google Image Landsat/ Copernicus.
3	8, 11		Map of Singapore. Retrieved June 22, 2018 from Google Maps. Map data ©2018 Google.
4	9, 11		By Josephsolomon92 - Own work, CC BY-SA 3.0, retrieved June 25, 2018 from https://en.wikipedia.org/w/index.php?curid=41463804 .
5	12		By Tyomitch - Own work, Copyrighted free use, retrieved June 25, 2018 from https://commons.wikimedia.org/w/index.php?curid=449735 .