

The Tourist Problem: (Analyzing the Solution) Video 5.6

Hon Wai Leong

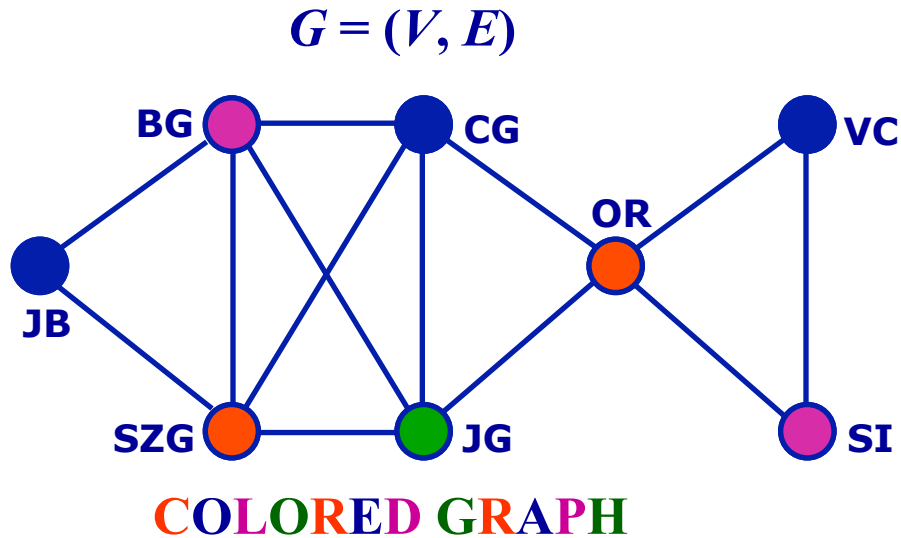
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Experience the fun of problem solving

You are *all EXCITED*



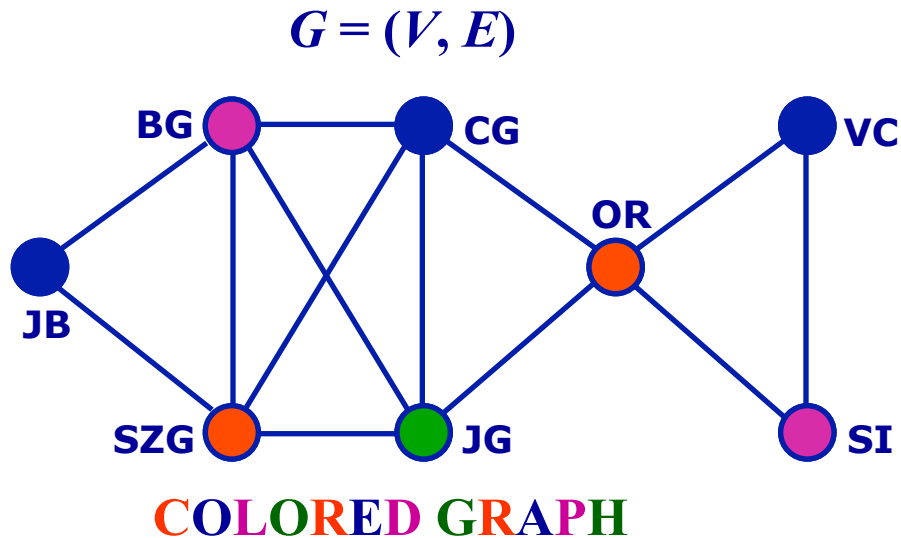
Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

Coloured graph \Rightarrow “Bus Schedule”

You got this Cool solution!

Q. What do you show your boss?

You show the *conflict graph*?



You proudly show him
the conflict graph,
the 4 colouring,
etc...

WRONG. WHY?

Q. What do you show your boss?

Answer: The conflict graph?

You show the *bus schedule*?

You should ATQ
(answer the question)
Show bus schedule.

Maybe even hide the Color

Day	Place
1	SZG, OR
2	JB, CG, VC
3	BG, SI
4	JG

“Bus Schedule”

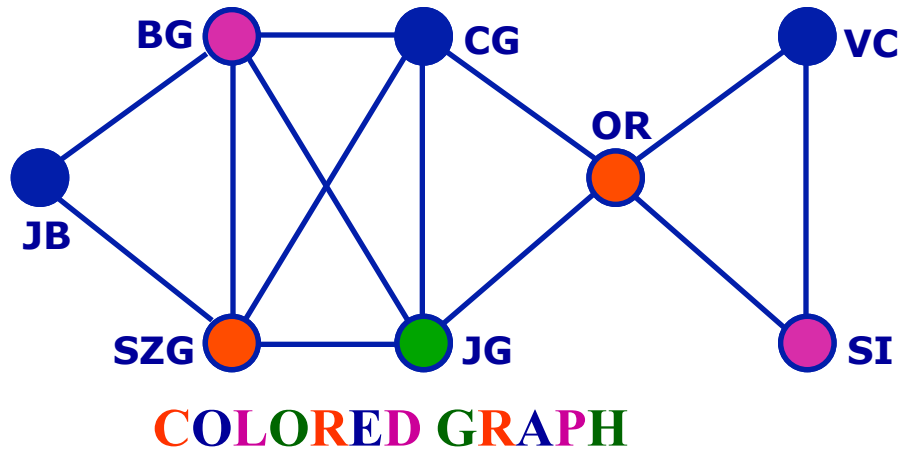
Q. What do you show your boss?

Answer: The bus schedule?





(Your view) vs (Boss' view)

□ Coloured graph

$$G = (V, E)$$



“Bus Schedule”

Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

You can see everything:
the graph model &
the solution.

You are more “powerful”

Your boss's
view of the
solution

Important Life Lesson



***Boss are very
hard to please...***

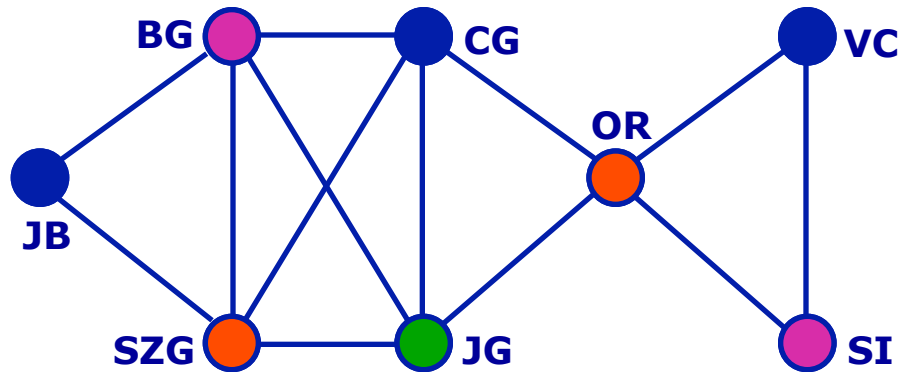
Evolving the Solution (1)

□ Coloured graph

⇒

“Bus Schedule”

$G = (V, E)$



COLORED GRAPH

Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

Boss: What about the list of tourists on each bus?

Can we get it from the graph model?

NO. *Why* NOT.

Models are not all powerful!

If you did not put certain info into the model, you cannot get those info from the model!

Alternative view of the data...

An Instance of Tourist Problem

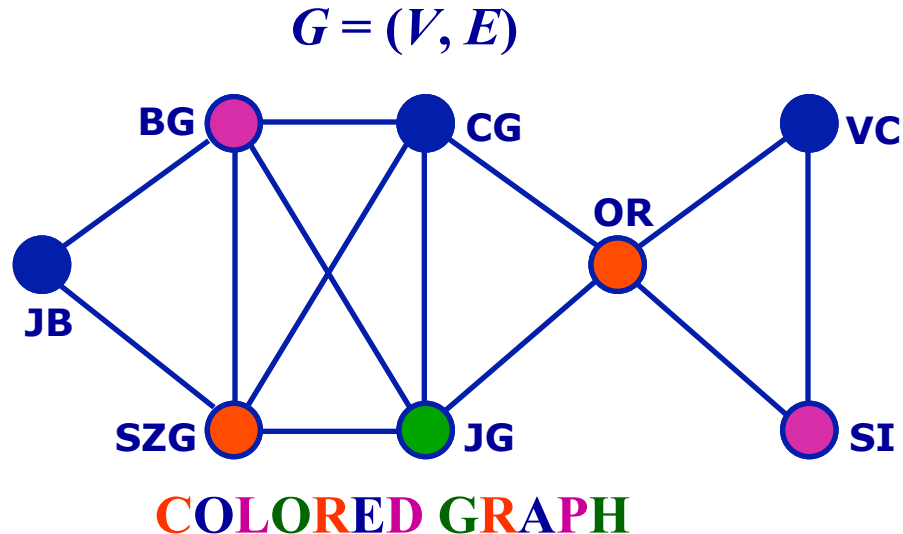
<u>Tourist</u>	<u>Places of Interest</u>
Aaron	SZG, BG, JB
Betty	CG, JG, BG
Cathy	VC, SI, OR
David	JG, CG, OR
Evans	CG, JG, SZG
Frances	BG, SZG, JB
Gary	CG, OR
Harry	JG, CG

Alternative Representation

Tourist	BG	CG	JB	JG	OR	SI	SZG	VC
Aaron	X		X				X	
Betty	X	X		X				
Cathy					X	X		X
David		X		X	X			
Evans		X		X			X	
Frances	X		X				X	
Gary		X			X			
Harry		X		X				

Evolving the Solution (2)

□ Coloured graph \Rightarrow “Bus Schedule”



Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

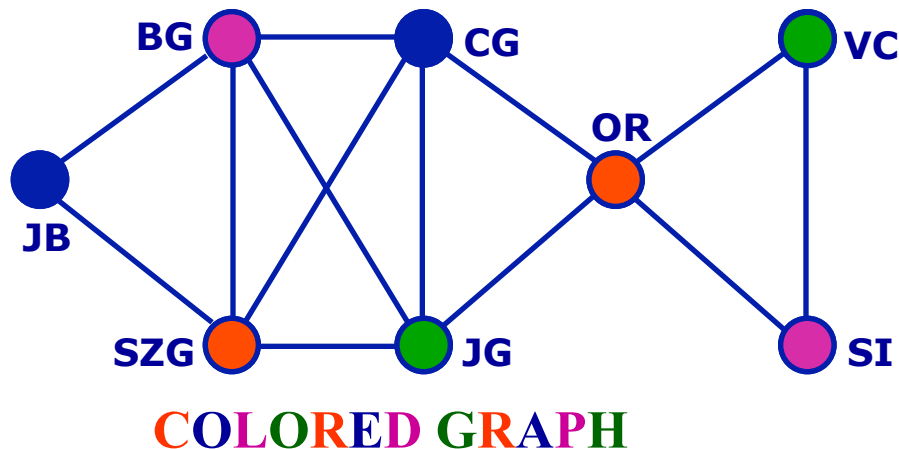
B1. What about the list of tourists on each bus? **

B2. What if you only have 2 buses?

Evolving the Solution (2)

□ Coloured graph \Rightarrow “Bus Schedule”

$$G = (V, E)$$



Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG, VC

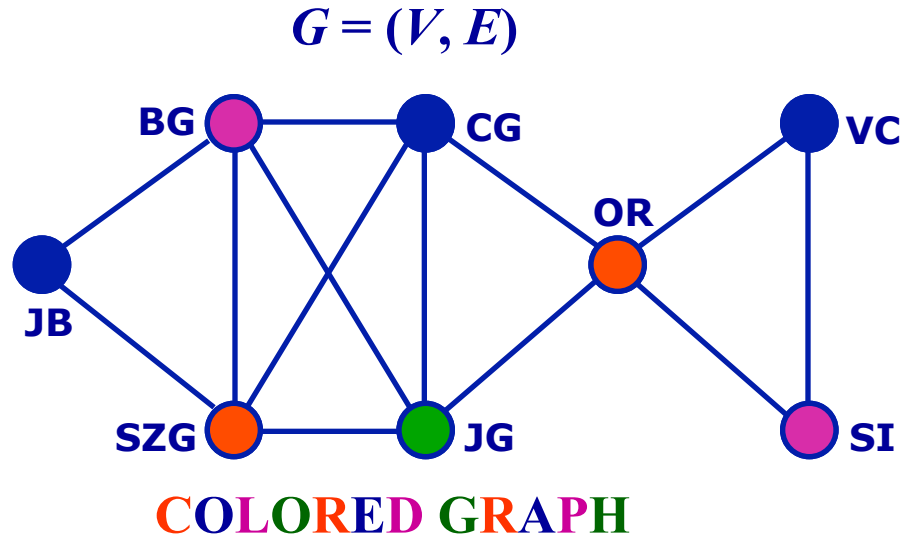
B1. What about the list of tourists on each bus? **

B2. What if you only have 2 buses?

- Look at the graph...
- Can colour vertex VC **green**.

Evolving the Solution (3)

□ Coloured graph \Rightarrow “Bus Schedule”



Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

B1. What about the list of tourists on each bus? **

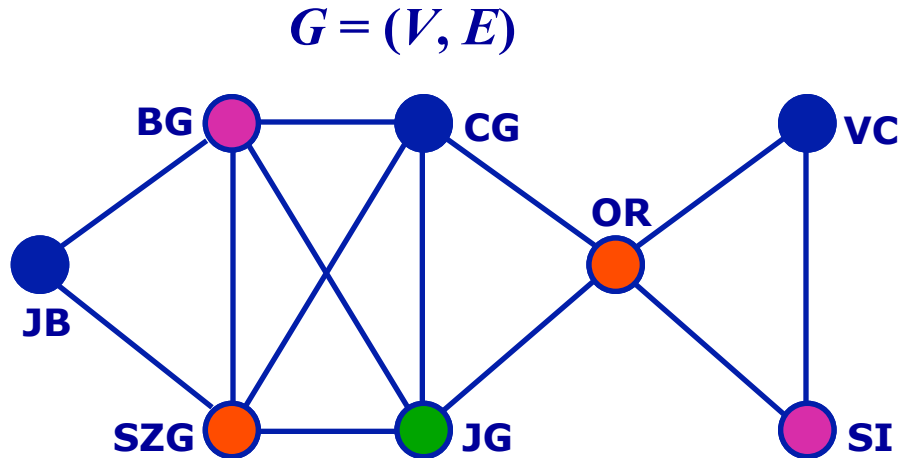
B2. What if you only have 2 buses? **

B3. What if BG is closed on Day 3?

• Can we re-order the colours?

Evolving the Solution (4)

□ Coloured graph \Rightarrow “Bus Schedule”



Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

B1. What about the list of tourists on each bus? **

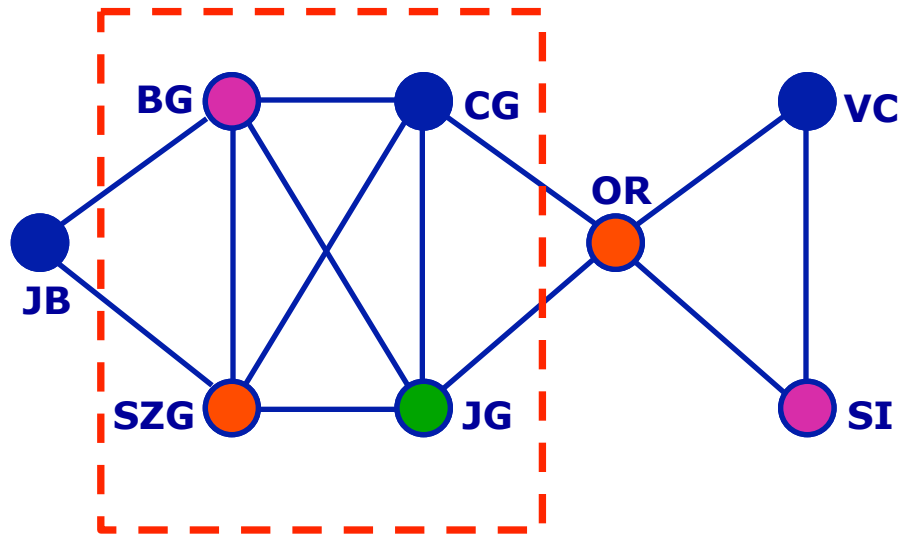
B2. What if you only have 2 buses? **

B3. What if BG is closed on Day 3? **

B4. Can we use fewer colours (fewer days)?

Evolving the Solution (4)

$$G = (V, E)$$



Technical Answer:

Look at {BG, CG, JG, SZG}
Each vertex is connect
to all the others
Each must be a different colour
So, at least 4 colours!

B1. What about the list of tourists on each bus? **

B2. What if you only have 2 buses? **





B3. What if BG is closed on Day 3? **

B4. Can we use fewer colours (fewer days)? **

Evolving the Solution (4)

Dilemma for tech people:

How to explain to Boss who does not want to learn graph modeling?

“Bus Schedule”		
Color	Day	Place
	1	SZG, OR
	2	JB, CG, VC
	3	BG, SI
	4	JG

**Your boss's
view of the
solution**

Lessons learnt:

- ❑ Graph Model is very versatile
 - ❖ It succinctly model TP-1.0 (video 5.4 & 5.5)
 - ❖ Graph colouring provide bus-schedule
- ❑ Graph model helps to respond to
 - ❖ last minute changes,
 - ❖ new conditions.
- ❑ Models are not all powerful
 - ❖ Use appropriately...

Moral of the Story

Some problems are easy
(Don't complicate them)

Give simple solutions first,
(analyze, improve, refine)

Modeling and Analysis are important
(lead to better, *cool*, solutions)

It is important to Ask Questions!

Reflection on the Process...

- ❑ In our TP, we started simple (TP v0)
 - ❖ Slowly add conditions, C1, C2, C3
 - ❖ Obtain solution for TP v1.0
 - ❖ Then respond to additional conditions (B2, B3)

- ❑ What if we started with a complex TP 2.0?
 - ❖ with conditions, C1, C2, C3, C4, C5
 - ❖ where $C4=B2$, and $C5=B3$
- ❑ Do you think we can have a good solution?

(End of video 5.6)

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School of Computing