

Concurrency & Vacuum Gripper

Name: _____

Lesson 6

Date: _____

Vocabulary

Concurrency - Two or more robots performing tasks simultaneously.

Run Concurrently Block - A code block that provides 2 frames for actions that will be run in parallel.

Porosity - Characteristic of a material, tiny spaces or holes through which liquids or air can pass.

Surface Texture - Characteristic of a material, the roughness/irregularity or smoothness/uniformity of the object surface.

Engage

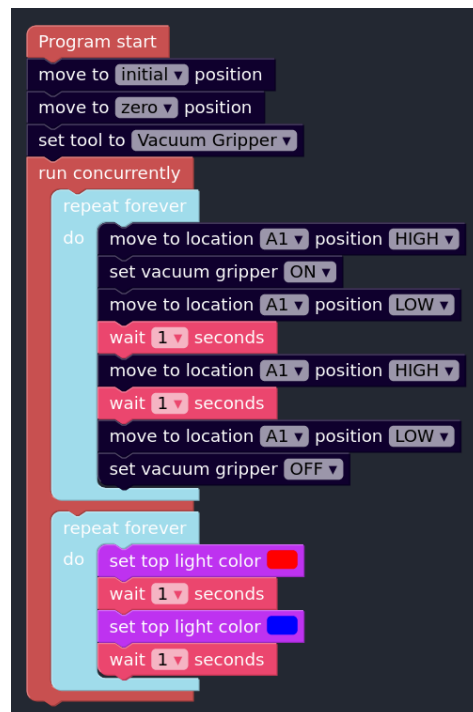
Look at the block code displayed by your instructor. The new run concurrently block wraps around two loops. What do you predict ORA and Evo will do when this code runs?

Evo will...

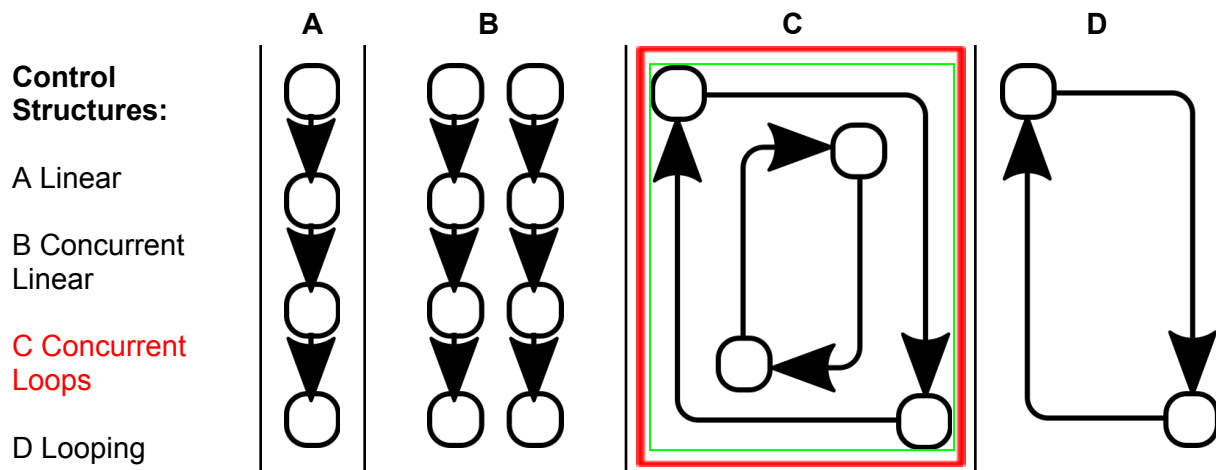
Change colors from red to blue then back to red and repeat indefinitely

Ora will...

Pick up Evo at A1, hold it in the air, then set it back down at A1



Which of the control structure diagrams fits the behavior of ORA and Evo?



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Explore

Mark with an X which objects you believe can be lifted by the Vacuum gripper. Then answer what characteristics are shared by objects that are vacuum gripper compatible and which characteristics are shared by objects that are NOT vacuum gripper compatible.

- | | |
|---|--|
| ☒ Ping Pong Ball | ☒ Plastic Bottle Cap |
| ☐ Textbook | ☒ Gift Card (or other similar cards like ID or store loyalty card) |
| ☐ Paper Clip | ☒ DVD/Blu-Ray Case |
| ☐ Sock | ☐ Pencil |
| ☐ Sponge | ☐ Golf Ball |
| ☐ LEGO structure (studs up) | |
| ☒ LEGO structure (smooth side up) | |

What characteristics are shared by the objects you marked as compatible with the vacuum gripper? Describe their surface, weight, shape, and/or porosity

Compatible objects have a smooth surface, light weight, wide or flat shape, and non-porous.

What characteristics are shared by the objects you marked as NOT compatible with the vacuum gripper? Describe their surface, weight, shape, and/or porosity

Incompatible objects have an irregular surface, heavy in weight, narrow or thin shape, and porous.

A vacuum gripper may be better than a robotic hand to grab objects with sides that are not even, such as glass panes on a car. Can you predict other objects where a vacuum gripper is superior to a finger gripper?

Packing objects in narrow boxes where the fingers of another tool wouldn't fit. Picking up delicate objects that may easily be crushed by finger grippers, such as lifting paper cups. Answers may vary.

Pick 3 objects you think may or may not work with the vacuum gripper that you would like to see tested

1. DVD/Blu-Ray Case

2. Sponge

3. Golf Ball

**Answers may vary*

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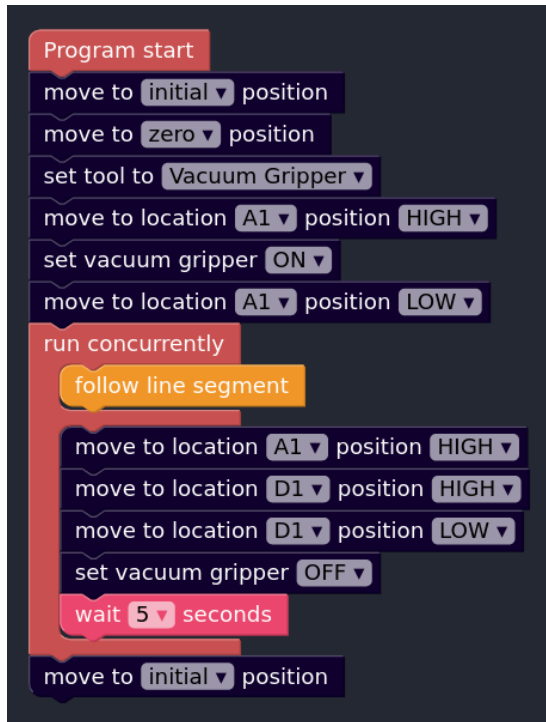
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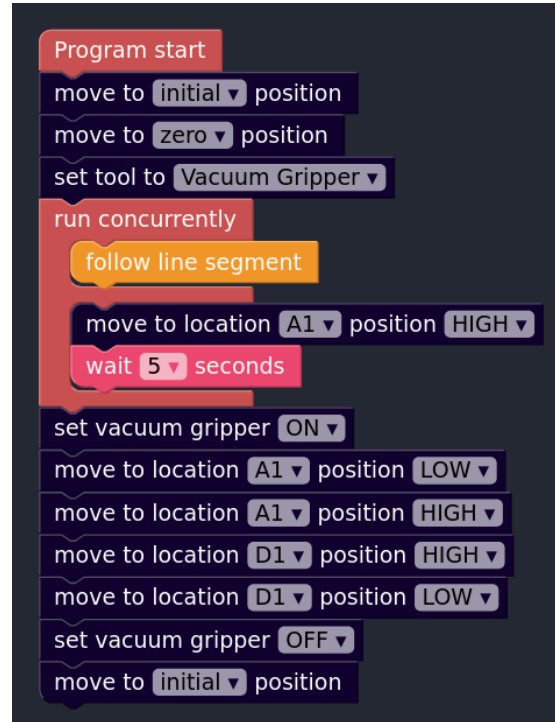
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Explain

A.



B.



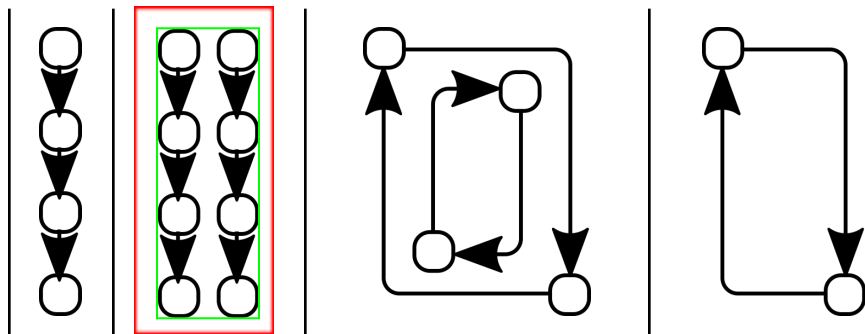
Analyze the two code samples and determine which one will grab the Evo if it follows a line from B1 to A1. When you determine which code works correctly, explain why planning concurrent code blocks requires planning where and when other steps are happening.

Which code sample will pick up Evo? **B**

When running concurrent code, why must you plan around when and where certain steps are happening?

If concurrent code is not planned based on which objects are moving where, and when, then the movements are unlikely to be coordinated. The ORA would attempt to pick up Evo when it's not in the location to be picked up, or similar errors. To successfully use concurrency, code must be planned knowing when and where things are moving.

What image represents the concurrent code of examples A and B?



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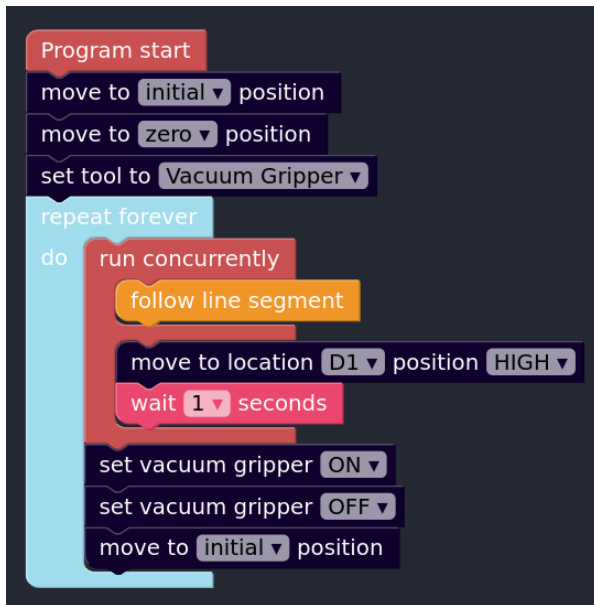
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Elaborate

Finish the incomplete starter code and fix any errors. Use ORA and Evo concurrently to create a loop of motions where Evo travels from D1 to A1, ORA picks up Evo and delivers Evo to D1, then Evo travels back to A1 to be picked up again.



Criteria

- ORA loops picking up and relocating Evo
- Evo line follows from D1 to A1 before ORA attempts a pickup at A1
- ORA carries Evo from A1 to D1
- Evo loops following the line segment
- The wait block is the shortest amount of seconds possible
- *Hint: Evo's speed can be altered for faster operation*

Evaluate

Please answer the following prompts.

Remember to include your **name** and **date** on this paper!

1. Mark which characteristics make good materials for the vacuum gripper.

☒ Smooth	☐ Rough	☒ Flat
☐ Porous	☒ Non porous	☐ Narrow
☐ Heavy	☒ Light	☐ Flexible

2. Describe how you can visually see concurrency when 2 robots are running code.

When two robots have movements at the same time, their code is running concurrently. Sequential-only code must run 1 robot at a time, but concurrency allows for running 2 parallel pieces of code with 2 separate robots.