KR-IST - Lecture 2b:
Route finding in Java

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This lecture looks at a search program for finding routes in a toy map of campus.
import java.util.*;

public class CampusSearch {

    String links[][] = {
        {"office", "debuggingRoom"},
        {"office", "CHI343"},
        {"CHI343", "informaticsSchoolOffice"},
        {"informaticsSchoolOffice", "ITS"},
        {"ITS", "PEV11A6"},
        {"PEV11A6", "PEV12A11"},
        {"PEV11A6", "library"},
        {"CHI343", "PEV11A6"},
        {"PEV12A11", "library"},
        {"library", "bridgeTeaBar"},
        {"library", "meetingHouse"},
        {"meetingHouse", "bridgeTeaBar"},
        {"bridgeTeaBar", "debuggingRoom"}};

    String goal = "meetingHouse";
Successor function

```java
ArrayList<String> getSuccessors(String location) {
    ArrayList<String> successors = new ArrayList<String>();
    for (int i = 0; i < links.length; i++) {
        if (links[i][0].equals(location)) {
            successors.add(links[i][1]);
        }
        if (links[i][1].equals(location)) {
            successors.add(links[i][0]);
        }
    }
    return (successors);
}
```
void run() {
    ArrayList<ArrayList<String>> open = new ArrayList<ArrayList<String>>();
    ArrayList<String> path = new ArrayList<String>();
    path.add("office");
    open.add(path);

    while (open.size() > 0) {
        path = open.remove(0);
        String parent = path.get(path.size()-1);
        if (parent.equals(goal)) {
            System.out.println("ROUTE: " + path);
        }
        ArrayList<String> successors = getSuccessors(parent);
        for (int i = 0; i < successors.size(); i++) {
            String child = successors.get(i);
            if (!path.contains(child)) {
                ArrayList<String> newPath = new ArrayList<String>(path);
                newPath.add(child);
                open.add(newPath);
            }
        }
    }
}
public static void main(String args[]) { // do the search
    new CampusSearch().run();
}
Running the program the traditional way

Compile the program with "javac", then run it with "java" command:

```
javac CampusSearch.java
java CampusSearch
```
If you are running Java via BlueJ, then you would run the program by explicitly calling the ‘run’ method of the CampusSearch class.

You could also explicitly call the ‘main’ method; i.e., right-click on the CampusSearch box, choose ‘void main(args)’. Then press ‘Ok’.
The program generates all possible routes connecting ‘office’ with ‘meetingHouse’, ordered by length.

ROUTE: [office, debuggingRoom, bridgeTeaBar, meetingHouse]
ROUTE: [office, debuggingRoom, bridgeTeaBar, library, meetingHouse]
ROUTE: [office, CHI343, PEV11A6, library, meetingHouse]
ROUTE: [office, CHI343, PEV11A6, PEV12A11, library, meetingHouse]
ROUTE: [office, CHI343, informaticsSchoolOffice, ITS, PEV11A6, library]
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- How is the goal for a particular search presented? How could we improve on this?
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- What strategy does this program use for purposes of producing solution paths?
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Exercises cont.
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