

R-6.4 Bob loves foreign languages and wants to plan his course schedule to take the following nine language courses: LA15, LA16, LA22, LA31, LA32, LA126, LA127, LA141, and LA169. The course prerequisites are:

- LA15: (none)
- LA16: LA15
- LA22: (none)
- LA31: LA15
- LA32: LA16, LA31
- LA126: LA22, LA32
- LA127: LA16
- LA141: LA22, LA16
- LA169: LA32.

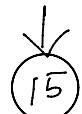
Find a sequence of courses that allows Bob to satisfy all the prerequisites.

Seems it can be mapped into a **Directed Graph** problem

Lets write the prerequisites list

LA15 < { None }

LA15 < { None } LA22 < { None }



LA22 < { None }

LA31 < { LA15 < None }

LA15 and LA22 have no prerequisites so we can choose either one of them as entry points

LA32 < { LA16 < LA15 or
LA31 < LA15 }

Lets see from where we can go to next from LA15 and LA22

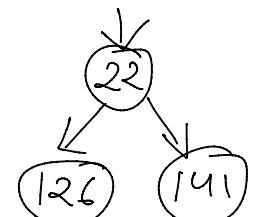
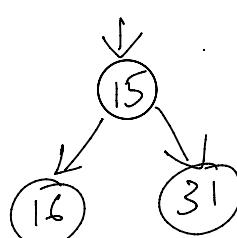
LA126 < { LA22 < None or

LA32 < { LA16 < LA15 or
LA31 < LA15 } }

LA16 < { LA15 < None }
LA31 < { LA15 < None }

LA126 < { LA22 < None }
LA141 < { LA22 < None }

LA127 < { LA16 < LA15 }



LA141 < { LA22 < None or

LA16 < LA15 }

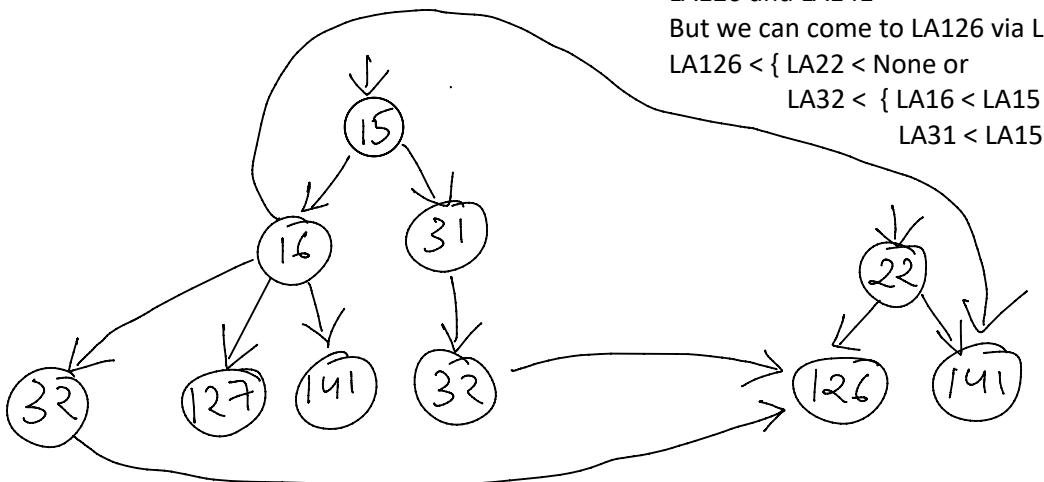
LA169 < { LA32 < { LA16 < LA15 or
LA31 < LA15 } }

Lets see from where we can go to
next from LA16 ,LA31 , LA 126 and LA141

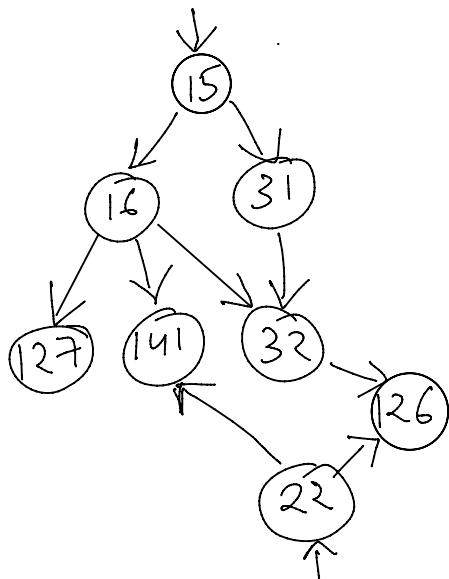
LA32 < { LA16 < LA15 }
LA127 < { LA16 < LA15 }
LA141 < { LA22 < None or
LA16 < LA15 }

LA32 < { LA31 < LA15 }

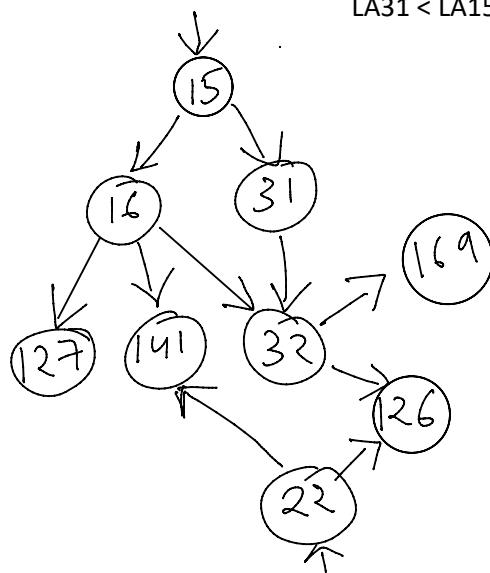
It doesn't seem we can go anywhere after
LA126 and LA141
But we can come to LA126 via LA32
LA126 < { LA22 < None or
LA32 < { LA16 < LA15 or
LA31 < LA15 } }



Above graph is messy, lets simplify it



Last piece to the puzzle is LA169
LA169 < { LA32 < { LA16 < LA15 or
LA31 < LA15 } }



BFS from 15 would give: 15,16,31,32,127,141,126,169

DFS from 15 would give: 15,16,32,126,169,127,141,31

Seems there is no path to 22, we can start from 22 but only 126 and 141 can be reached from it.

But neither BFS nor DFS output has all vertices in it we will continue to search for other vertices

And by given constraints LA22 doesn't have any prerequisite it can be covered at the end as well

So the sequence in which Bob can cover all the courses by satisfying the prerequisites are

LA15,LA16,LA31,LA32,LA127,LA141,LA126,LA169,LA22 or

LA15,LA16,LA32,LA126,LA169,LA127,LA141,LA31,LA22

