Recursion and Iteration

Yiming Zhang

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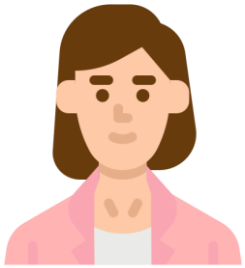
Meet Alice and Bob



New York citizen

Traveler to New York

Grand Central Station to Central Park

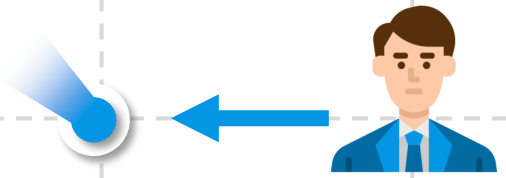
Different ways

Grand Central Station to Central Park

Alice knows the route very well

Grand Central Station to Central Park

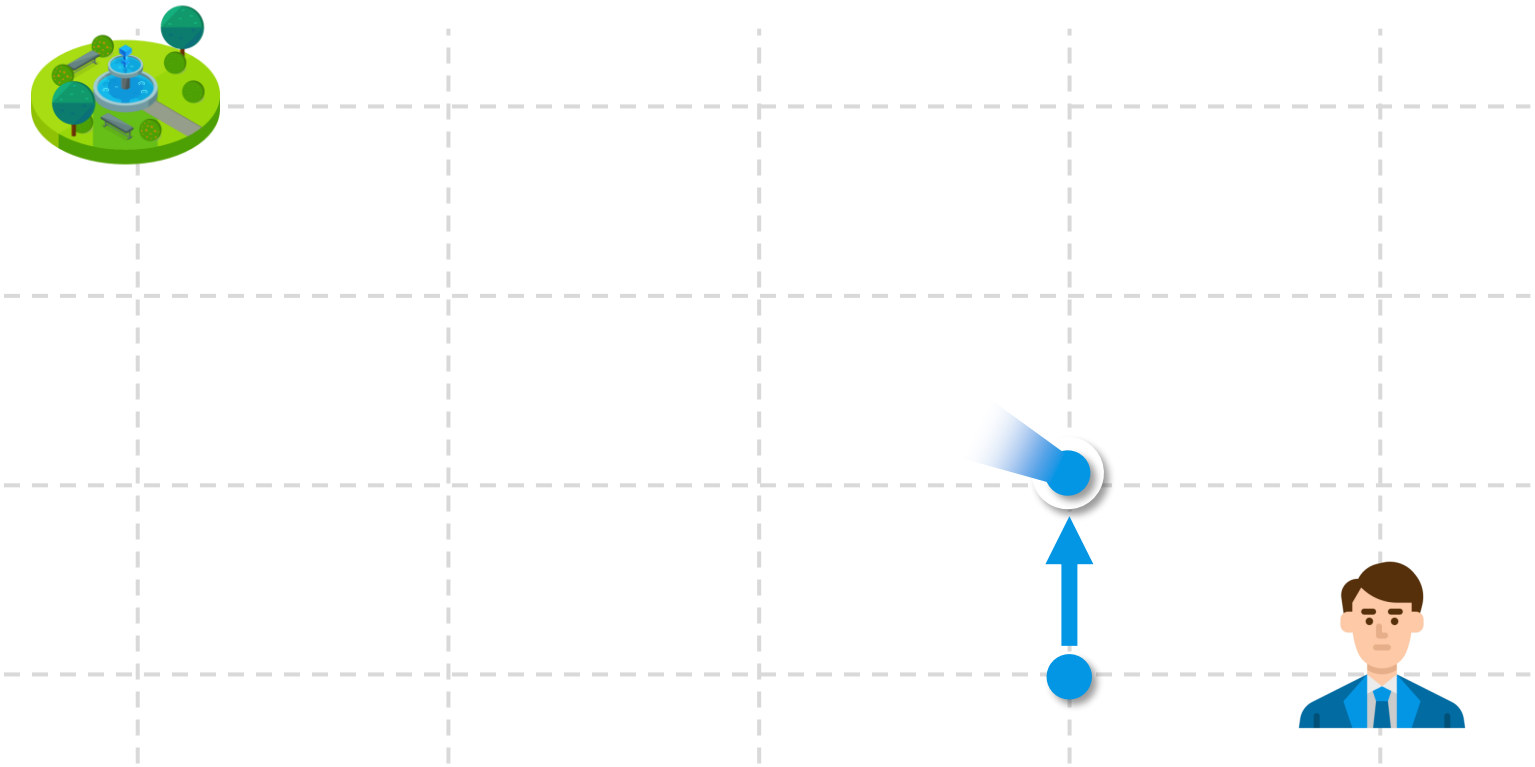
Bob relies on Google Map



“I don’t know all the future steps, but I still can make a simple and correct move.”

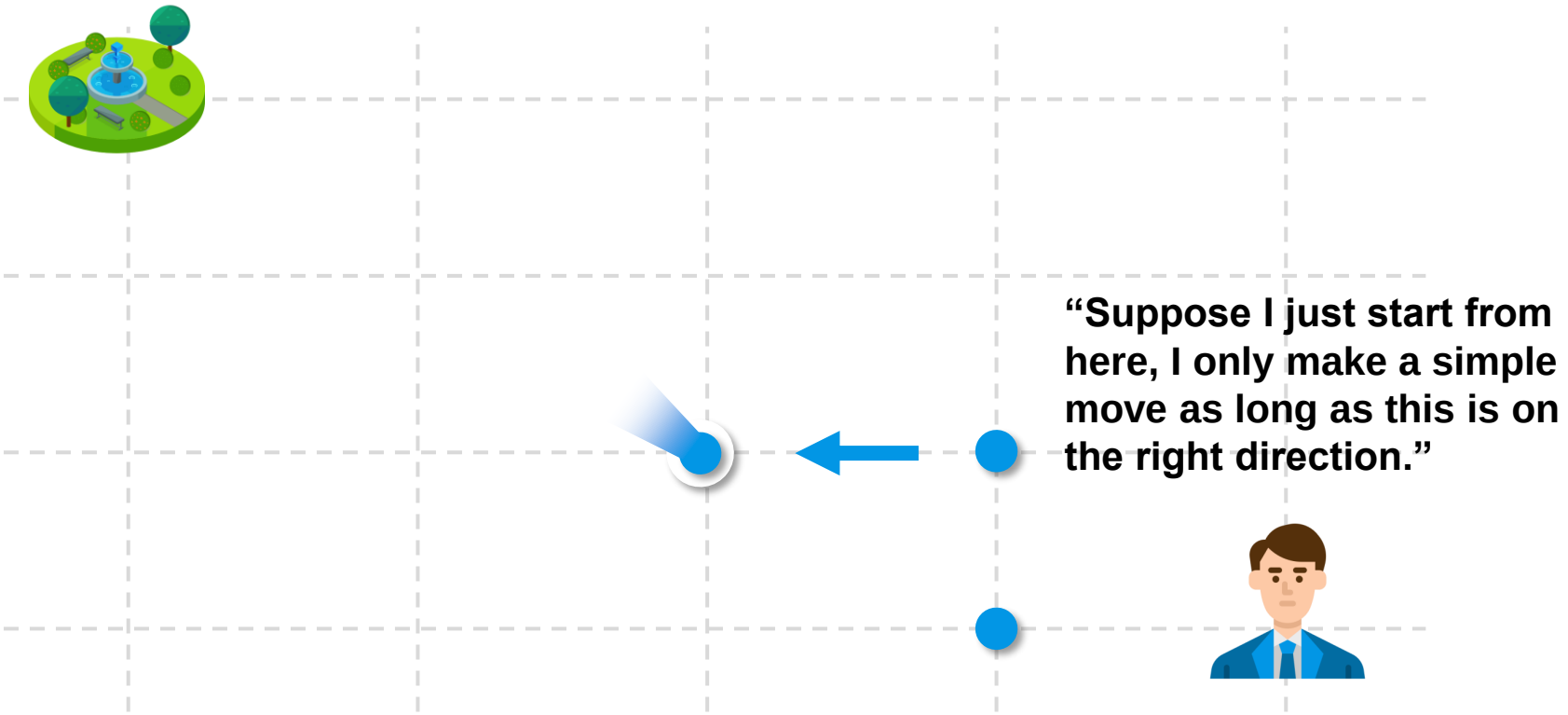
Grand Central Station to Central Park

Bob relies on Google Map



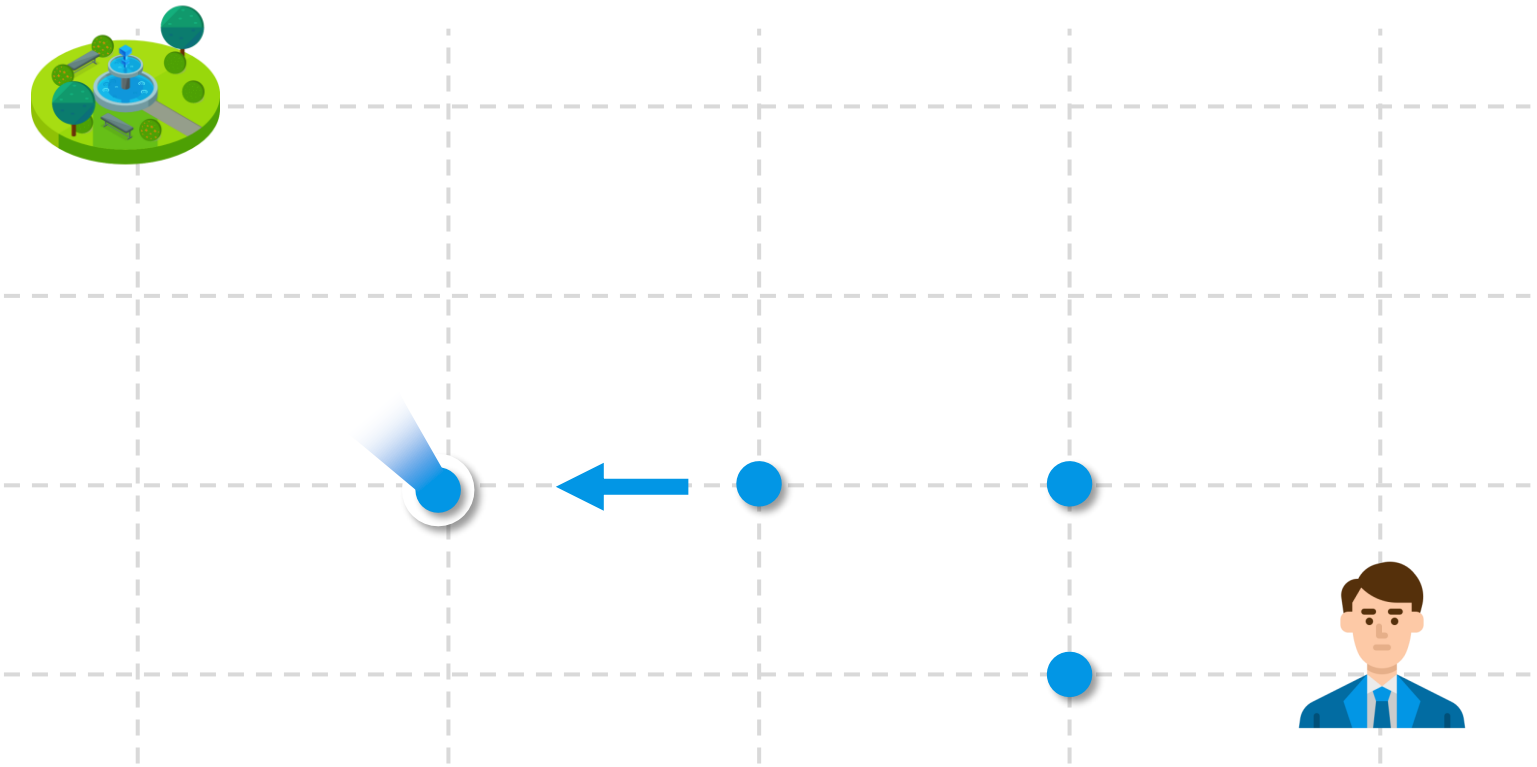
Grand Central Station to Central Park

Bob relies on Google Map



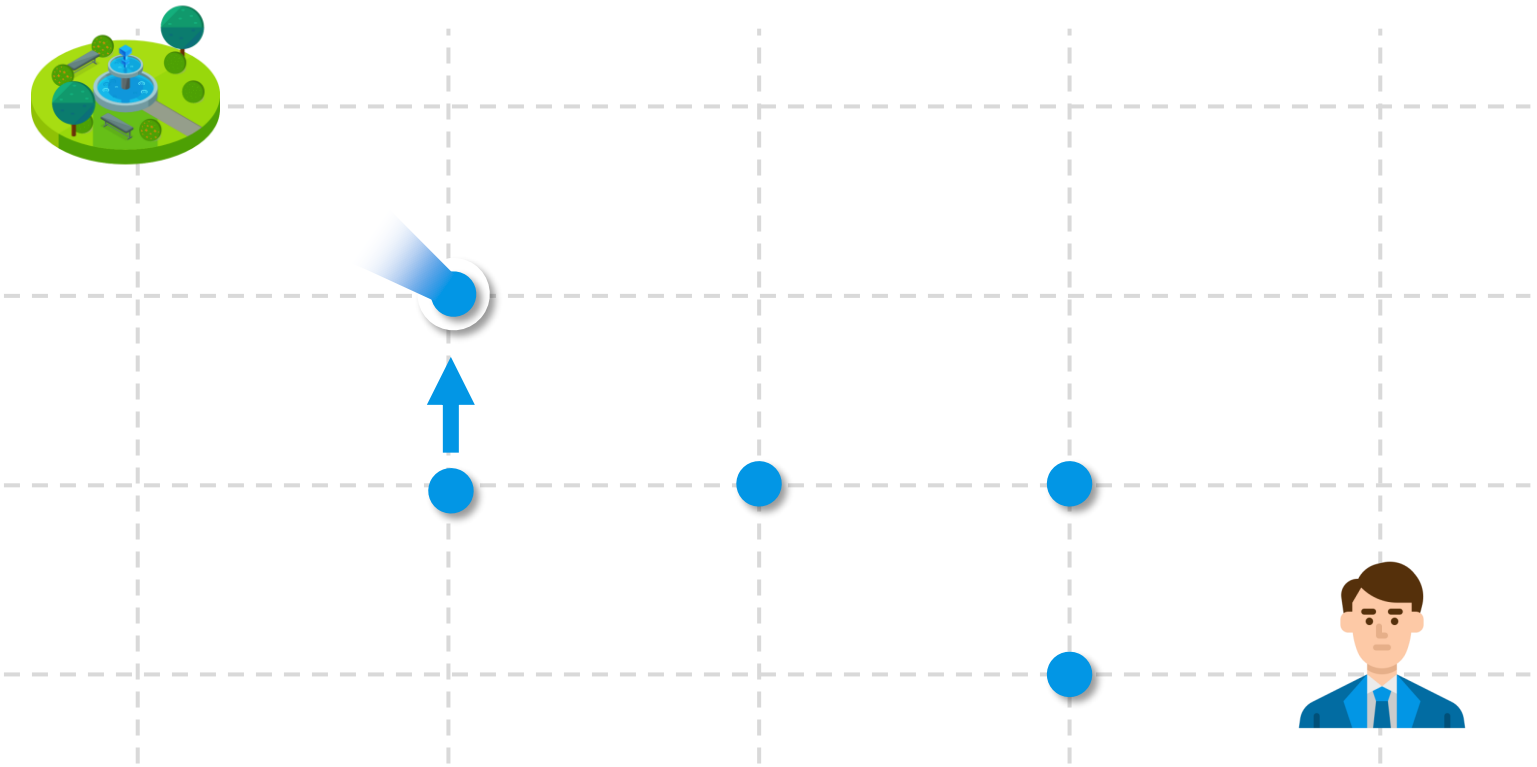
Grand Central Station to Central Park

Bob relies on Google Map



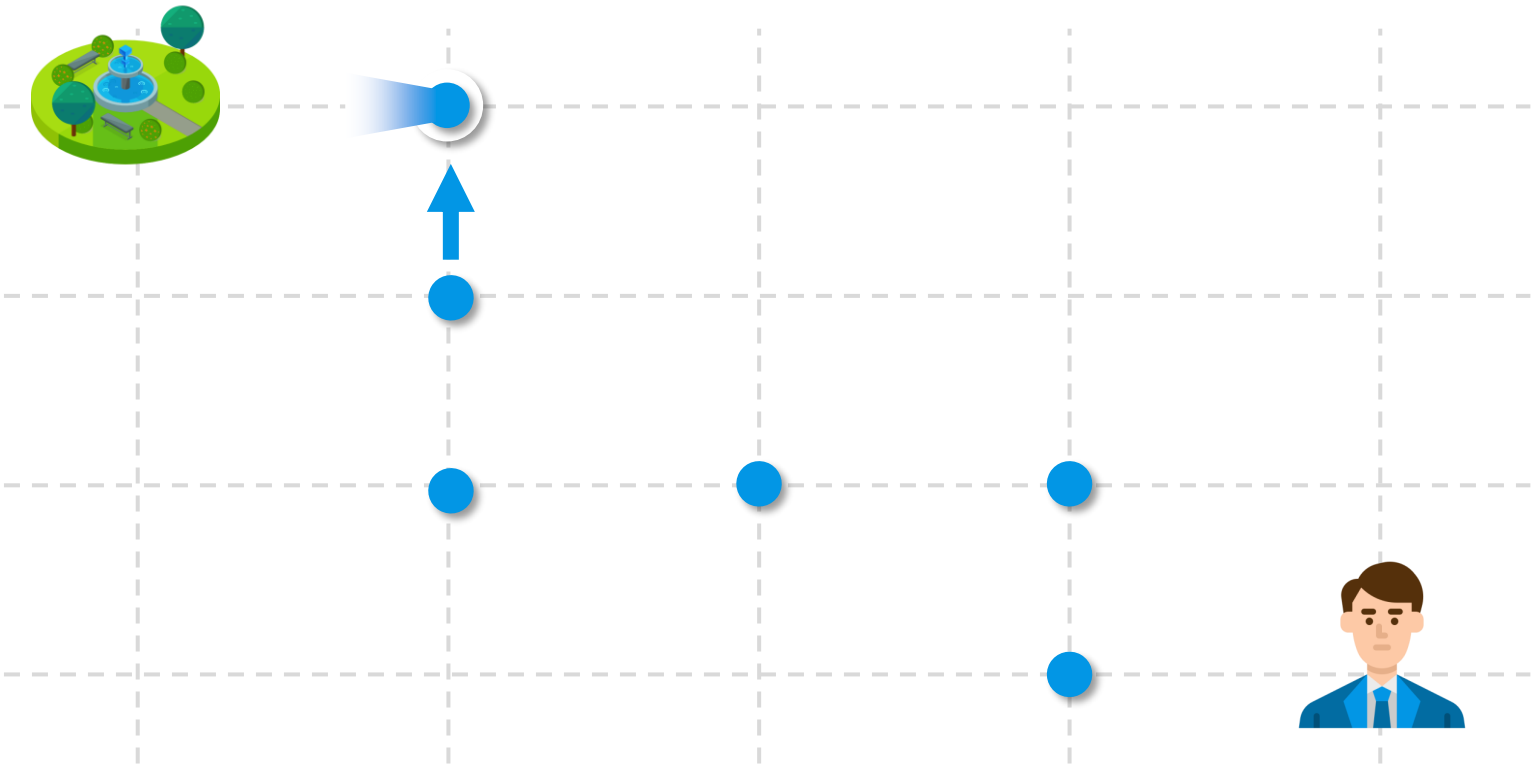
Grand Central Station to Central Park

Bob relies on Google Map



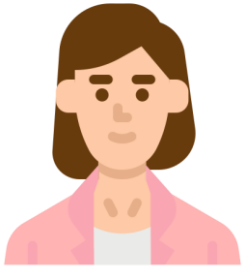
Grand Central Station to Central Park

Bob relies on Google Map



Summary

Different approaches to solve the problem



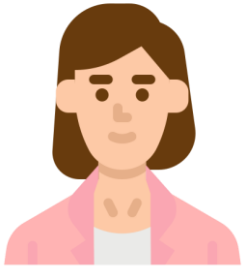
- Know exactly where to stop and where to turn
- Need to memorize the map first

- Find a direction
- Make a simple move
- Find the direction again
- Repeat until arriving the park!

Connection

Iteration and Recursion

“Iteration”



- Act according to the map she memorized
- Fast but need some knowledge

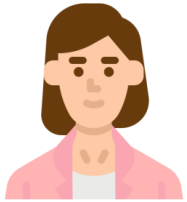
“Recursion”

- Solve a big problem by taking small and repetitive actions
- Simple but not efficient

A Math Example

Do you know the next numbers?

2 4 6 8 ? ?



“These are consecutive even numbers, so they must be 10 and 12.”

- Fast, but she has to know the patterns

A Math Example

Do you know the next numbers?

2 4 6 8 ? ?

“Each number is equal to the previous number plus 2”

- Simple, only need to see relationships between two numbers

A Math Example

Do you know the next numbers?

“I can still solve the problem even if I only know the simple relationship!”

A Math Example

Do you know the next numbers?

2 4 6 8 ? ?

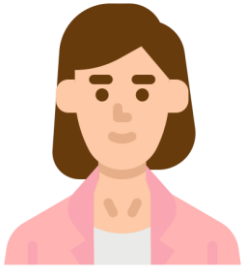
+2 +2

“I can still solve the problem even if I only know the simple relationship!”

Connection

Iteration and Recursion

“Iteration”



- Solve the numbers by applying the rules forward
- Fast but need some knowledge

“Recursion”

- Solve the numbers by looking backward and repeatedly plus 2
- Simple but not efficient

End

Recursion and Iteration

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