What while-loop condition will stop the loop when the city is not found?

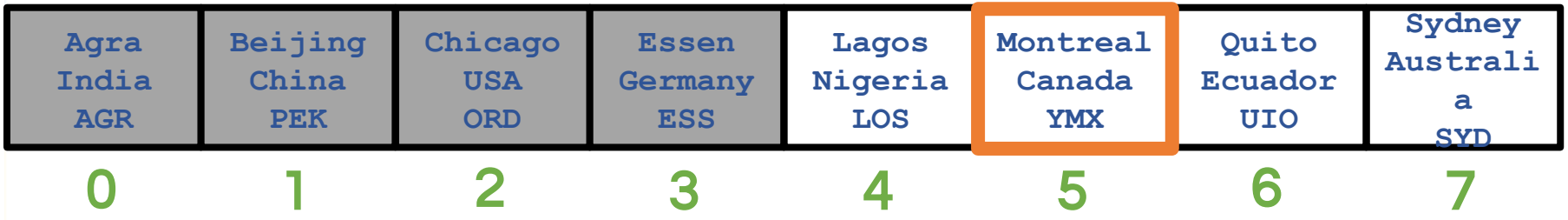
Agra India AGR	Beijing China PEK	Chicago USA ORD	Essen Germany ESS	Lagos Nigeria LOS	Montreal Canada YMX	Quito Ecuador UIO	Sydney Australia SYD
0	1	2	3	4	5	6	7

toFind: Istanbul low: 0 high: 7 mid: 3

What while-loop condition will stop the loop when the city is not found?

toFind Istanbul low 4 high 7 mid 3

What while-loop condition will stop the loop when the city is not found?



toFind Istanbul low 4 high 7 mid 5

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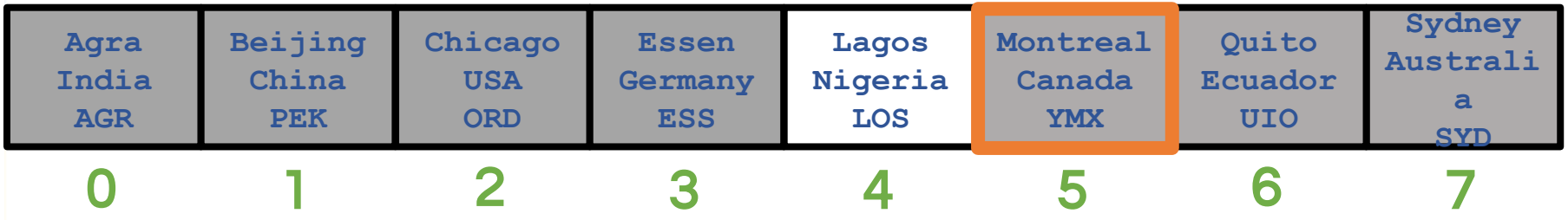

toFind Istanbul low 4 high 4 mid 5

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`toFind` Istanbul `low` 4 `high` 4 `mid` 4

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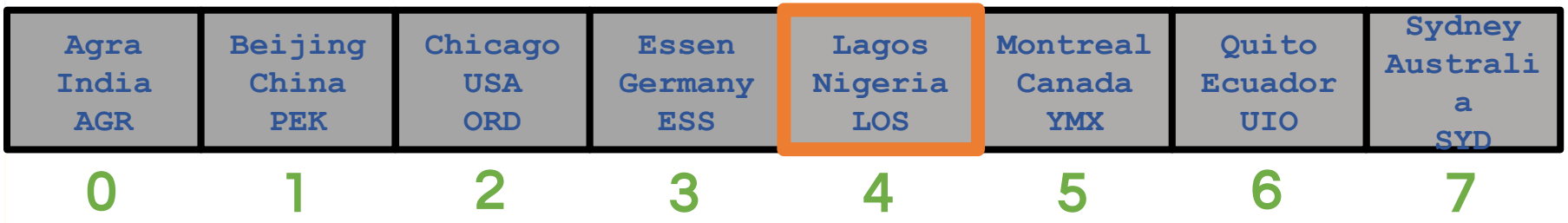

toFind `Istanbul` low `4` high `3` mid `4`

```
// toFind is a city name
public static String findAirportCodeBS(String toFind,
                      Airport[] airports)    {
  int low = 0;
  int high = airports.size();
  int mid;
  while (low <= high) {
    mid = (low + high)/2;
    int compare = toFind.compareTo(airports[mid].getCity());
    if (compare < 0) {


    }
    else if (compare > 0) {


    }
    else
  }
  return null;
}
```

Airport:
getCity()
getPort()
getCode()

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// toFind is a city name
public static String findAirportCodeBS(String toFind,
                      Airport[] airports)    {
  int low = 0;
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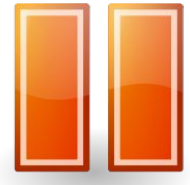
  int mid;
  while (low <= high) {
    mid = (low + high)/2;
    int compare = toFind.compareTo(airports[mid].getCity());
    if (compare < 0) {
      high = mid - 1;
    }
    else if (compare > 0) {
      low = mid+1;
    }
    else return airports[mid].getCode();
  }
  return null;
}
```

Airport:
getCity()
getCode()

```
// toFind is a city name
public static String findAirportCodeBS(String toFind,
                      Airport[] airports)    {
  int low = 0;
  int high = airports.size();
  int mid;
  while (low <= high) {
    mid = low + ((high-low)/2);
    int compare = toFind.compareTo(airports[mid].getCity());
    if (compare < 0) {
      high = mid - 1;
    }
    else if (compare > 0) {
      low = mid+1;
    }
    else return airports[mid].getCode();
  }
  return null;
}
```

Airport:
getCity()
getCode()

Thought questions



- If we're very unlucky, how many ArrayList elements did linear search have to look at, if there are N elements in the list?
- If we're very unlucky, how many ArrayList elements does binary search have to look at?

n	2	32	1024	32768	~1M	~1B
$\log_2 n$	1	5	10	15	20	30

7.2 Billion people in the world