

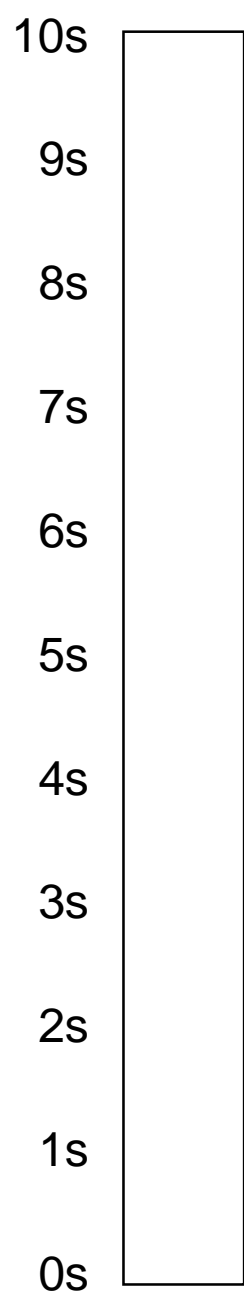


From <https://www.pexels.com/photo/grayscale-photography-of-assorted-shirts-hanged-on-clothes-rack-1884584/>

# Lists and Hick's Law

# Learning Goals

- Know how long it takes to find an item in a list
- Understand why it is good to sort or group items

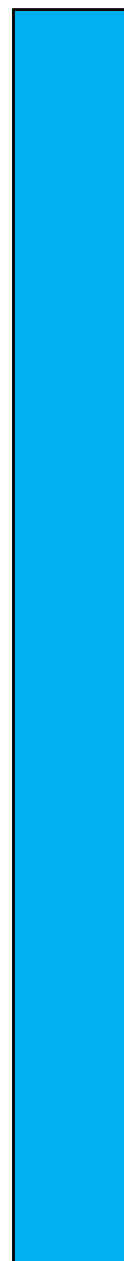


Find Denmark

- Russia
- Ukraine
- France
- Spain
- Sweden
- Norway
- Germany
- Finland
- Poland
- Italy
- United Kingdom
- Romania
- Belarus
- Kazakhstan
- Greece
- Bulgaria
- Iceland
- Hungary
- Portugal
- Austria
- Czechia
- Serbia
- Ireland
- Lithuania

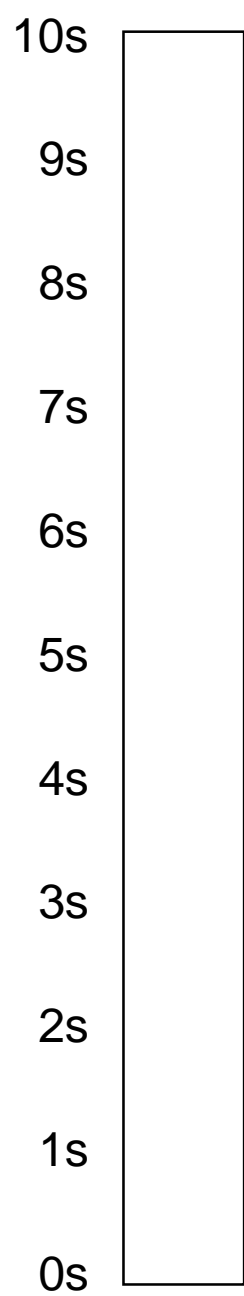
- Latvia
- Croatia
- Bosnia and Herzegovina
- Slovakia
- Estonia
- Denmark
- Switzerland
- Netherlands
- Moldova
- Belgium
- Armenia
- Albania
- North Macedonia
- Turkey
- Slovenia
- Montenegro
- Kosovo
- Cyprus
- Azerbaijan
- Luxembourg
- Georgia
- Andorra
- Malta
- Liechtenstein

10s  
9s  
8s  
7s  
6s  
5s  
4s  
3s  
2s  
1s  
0s



Find Denmark

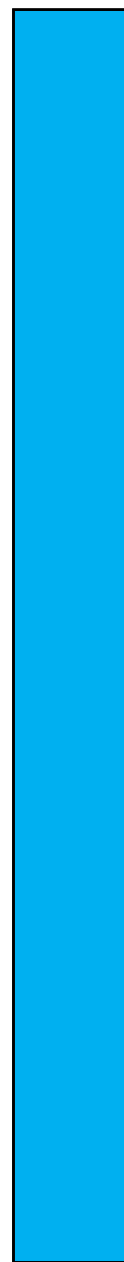
- We have a list with  $n$  items in an unknown order
- Time obviously increases with  $n$
  
- What is the time complexity for an algorithm in Big O notation?
- $O(n)$



Find Denmark

- Albania
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- Azerbaijan
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- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey
- Ukraine
- United Kingdom

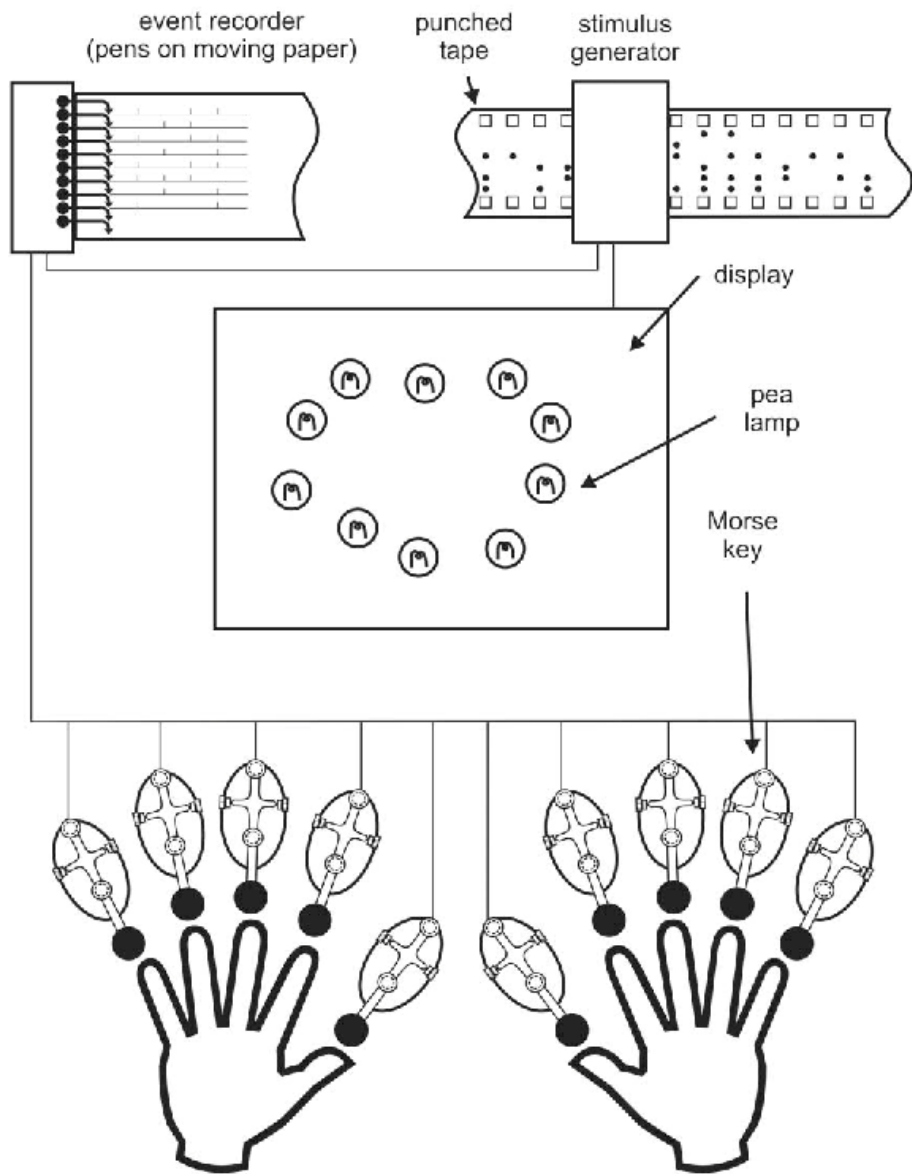
10s  
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3s  
2s  
1s  
0s



Find Denmark

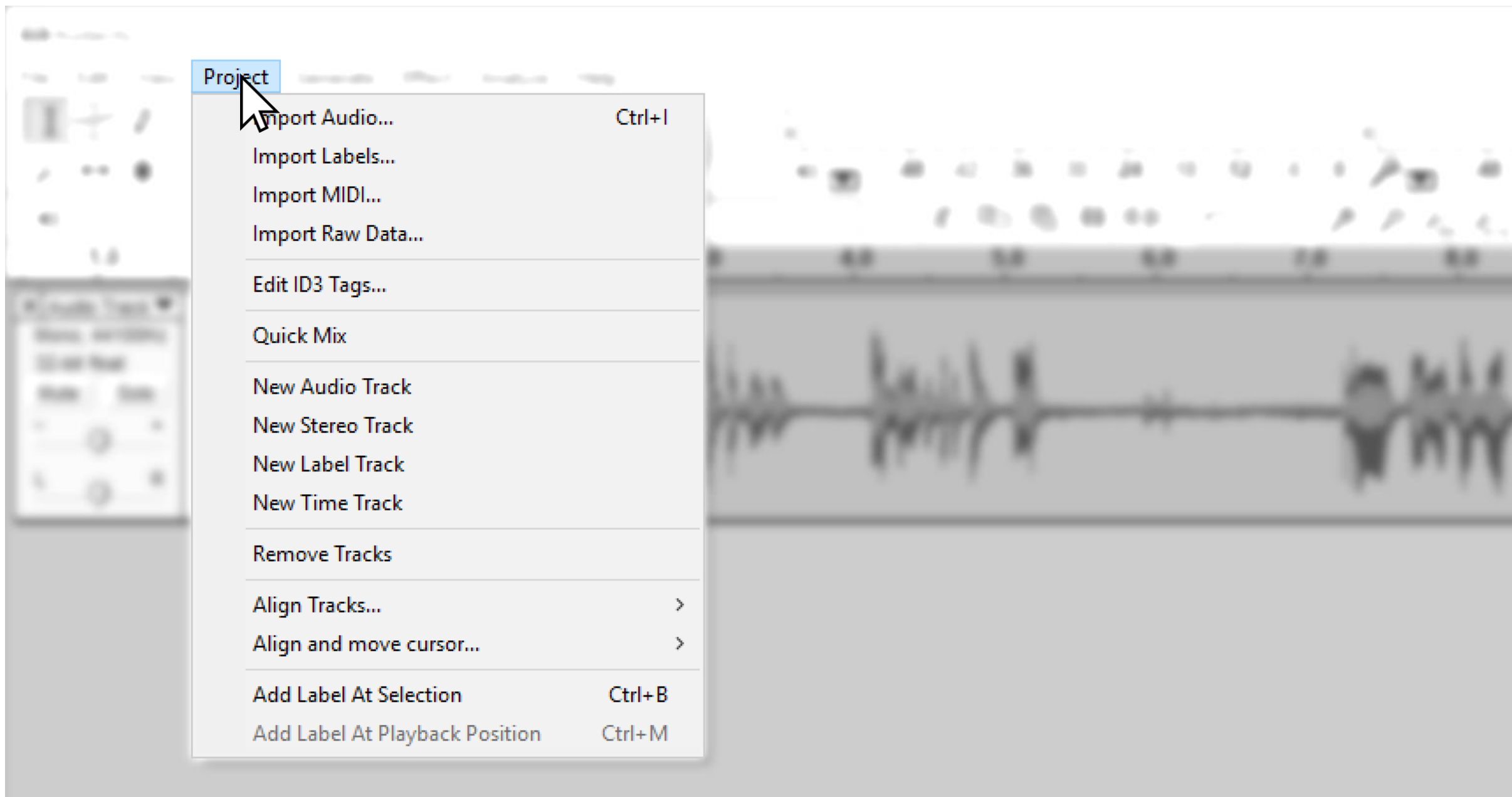
- We have a list with  $n$  items in a known order
- Time obviously increases with  $n$
  
- What is the time complexity for an algorithm in Big O notation?
- $O(\log(n))$





From Seow, S. C. (2005). Information theoretic models of HCI: a comparison of the Hick-Hyman law and Fitts' law. *Human-computer interaction*, 20(3), 315-352.

- Given  $n$  equally probable choices, the average reaction time  $T$  required to choose among the choices is approximately:
  - $T = b \cdot \log_2(n + 1)$
  - Common practical value:  $b=150$  ms/bit
  
- Hick's Law is often used to motivate menu designs
  - In an unordered list, search time is linear
  - In an ordered list, search time becomes logarithmic



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