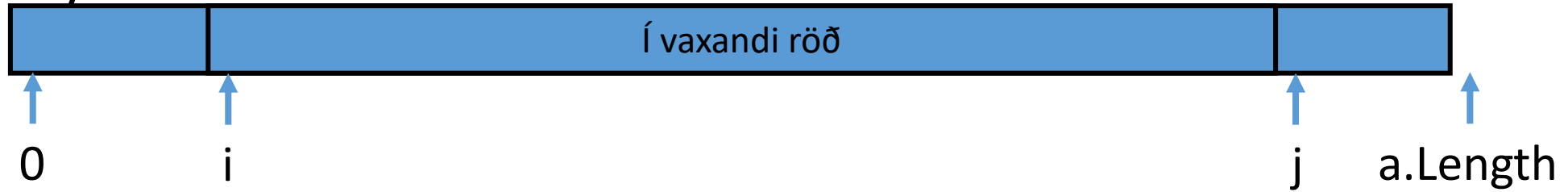


Fastayrðingar helmingunarleitar

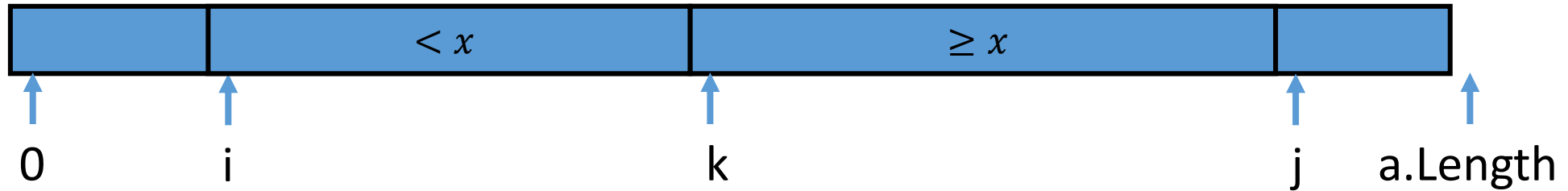
snorri@hi.is

Helmingunarleit að fremsta sæti $\geq x$ í vaxandi runu

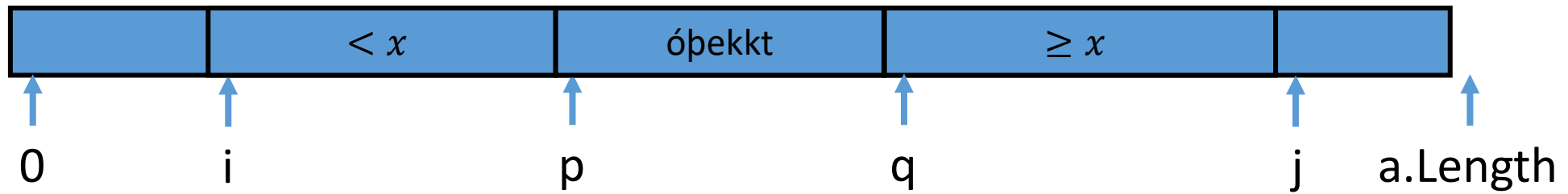
Forskilyrði



Eftirskilyrði

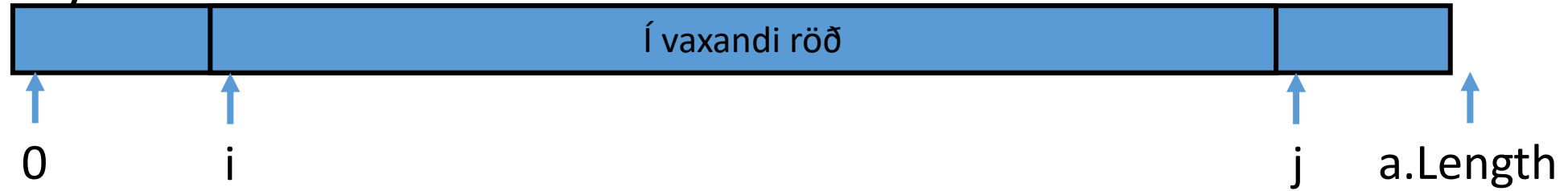


Fastayrðing lykkju

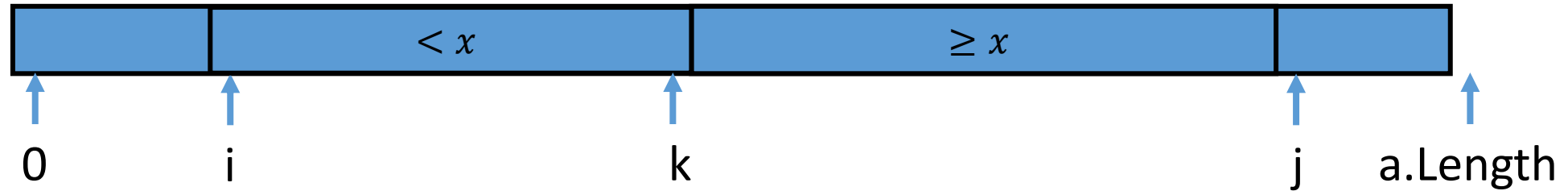


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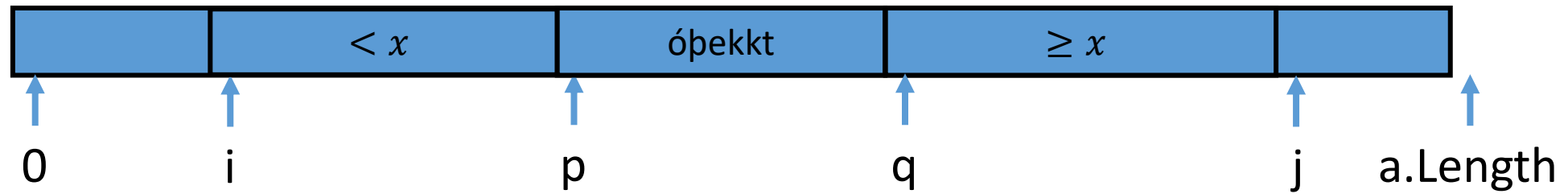
Forskilyrði



Eftirskilyrði

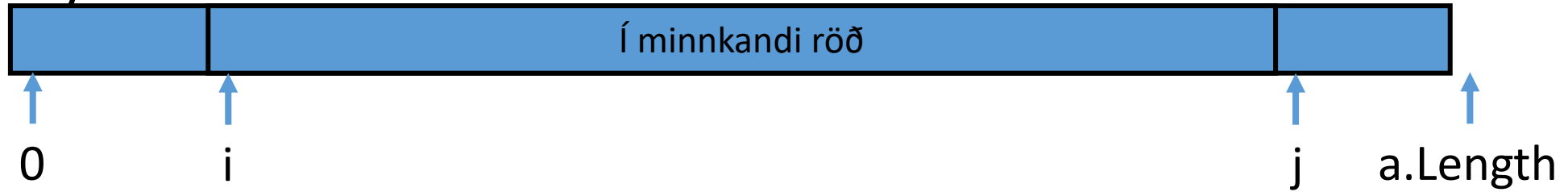


Fastayrðing lykkju

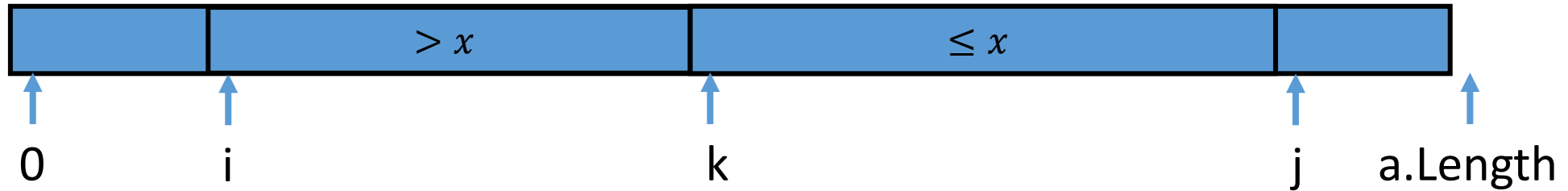


Helmingunarleit að fremsta sæti $\leq x$ í minnkandi runu

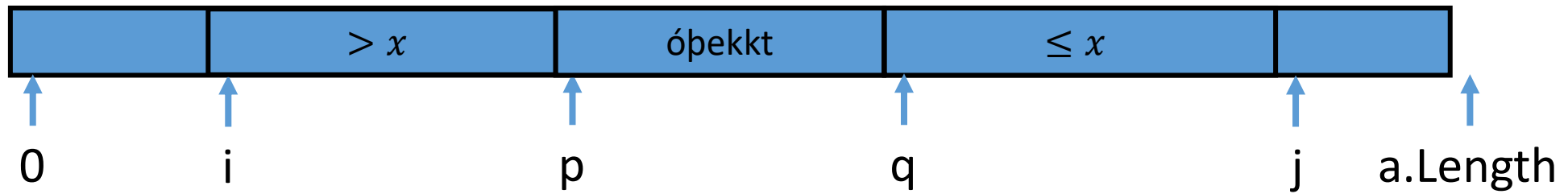
Forskilyrði



Eftirskilyrði

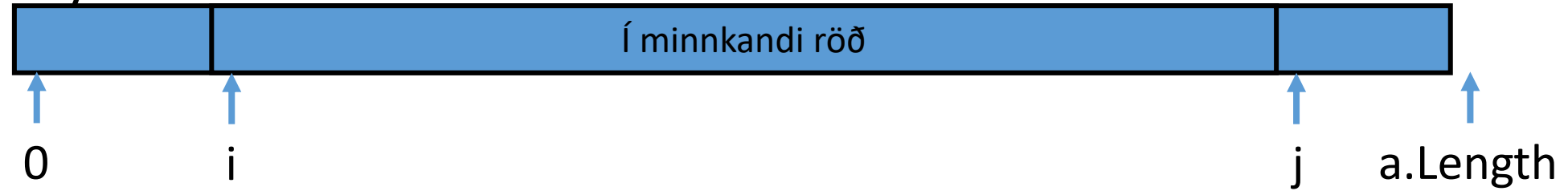


Fastayrðing lykkju

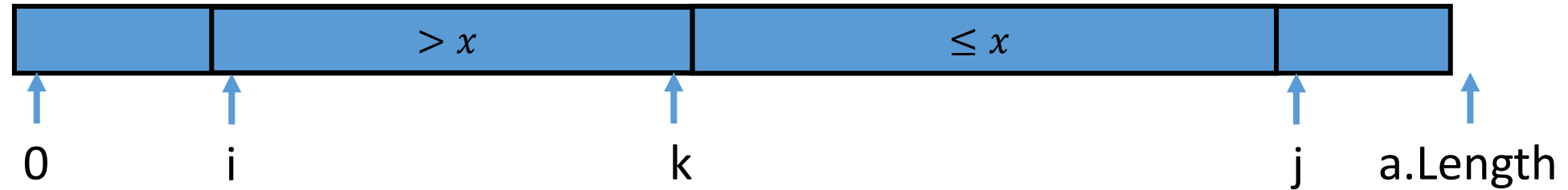


Helmingunarleit að aftasta sæti $> x$ í minnkandi runu

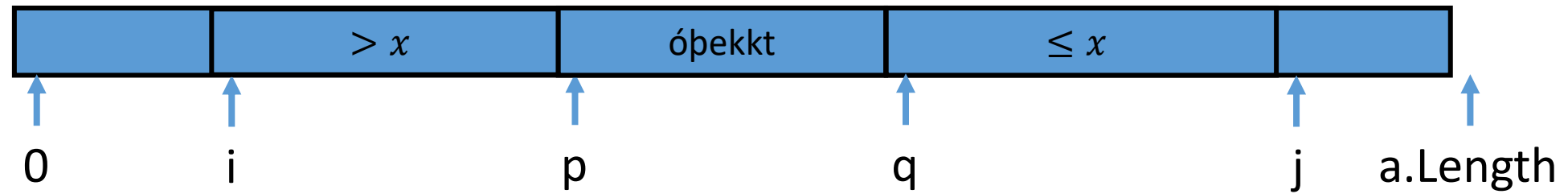
Forskilyrði



Eftirskilyrði

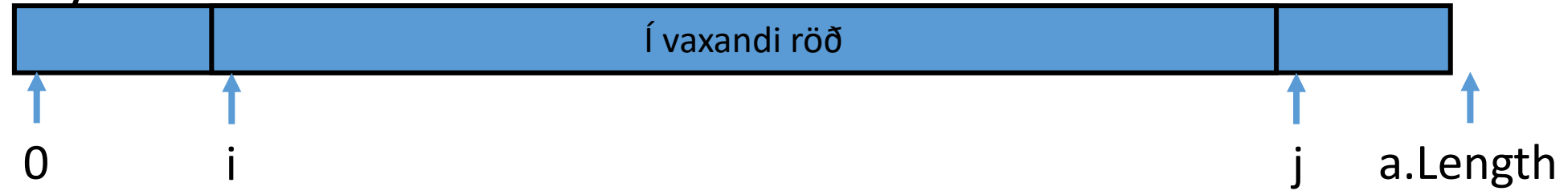


Fastayrðing lykkju

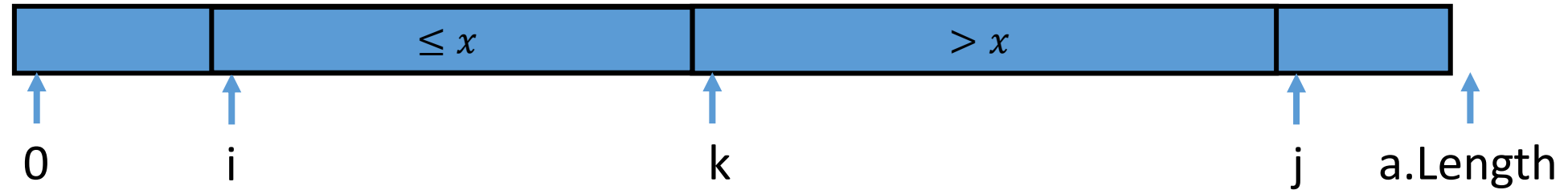


Helmingunarleit að fremsta sæti $> x$ í vaxandi runu

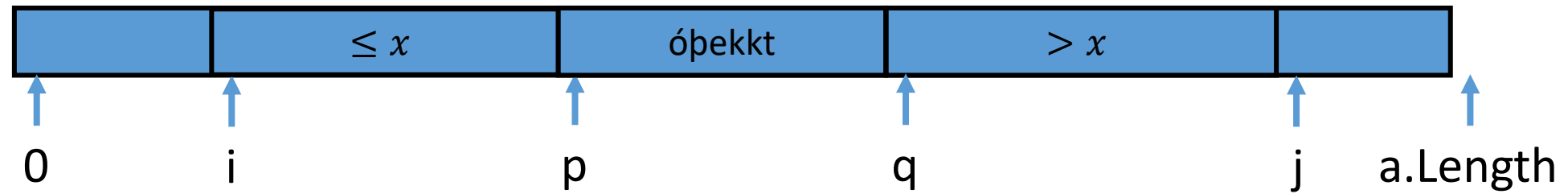
Forskilyrði



Eftirskilyrði

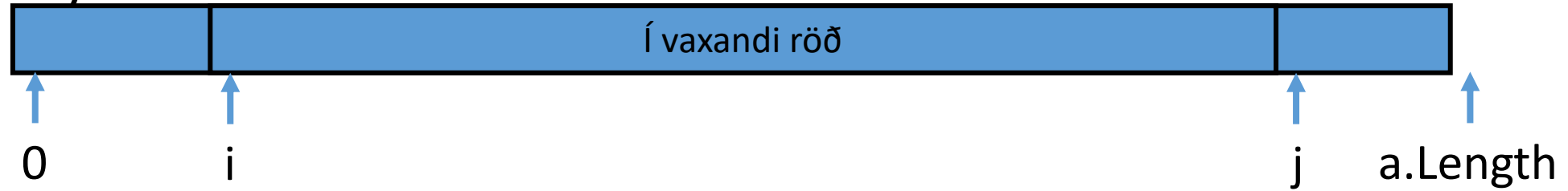


Fastayrðing lykkju

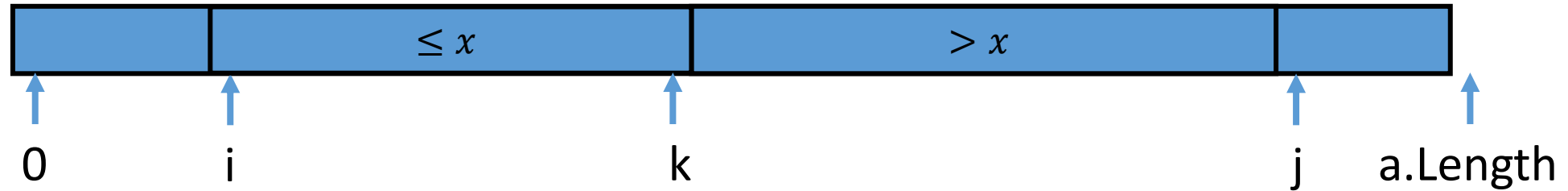


Helmingunarleit að aftasta sæti $\leq x$ í vaxandi runu

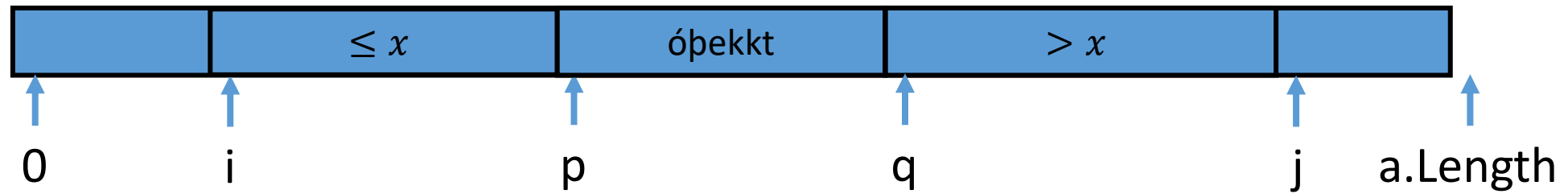
Forskilyrði



Eftirskilyrði

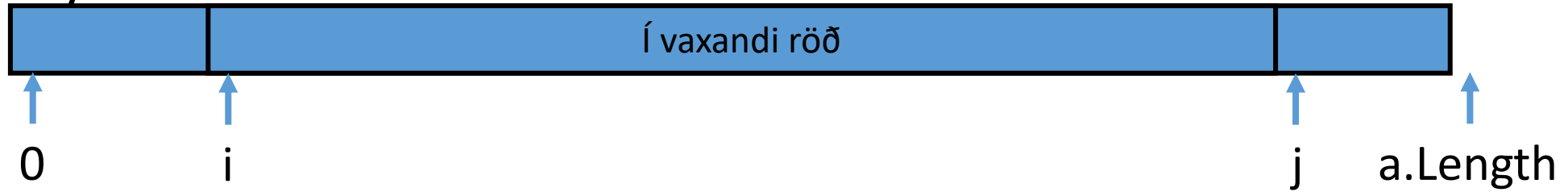


Fastayrðing lykkju

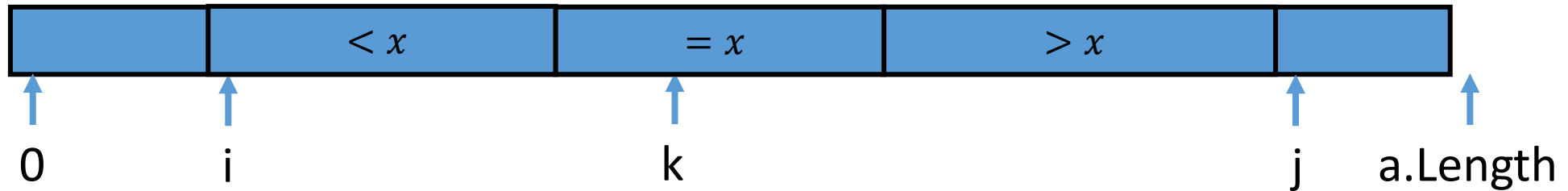


Helmingunarleit að einhverju sæti = x í vaxandi runu

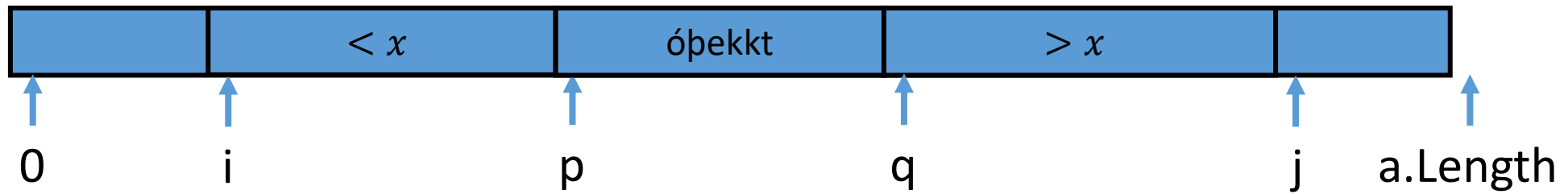
Forskilyrði



Eftirskilyrði (ef x er til)

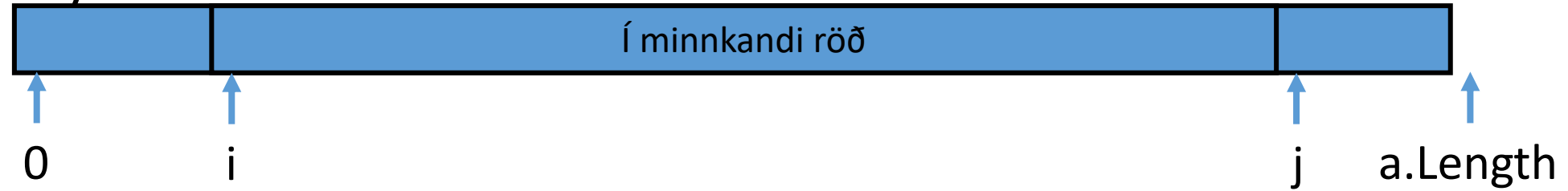


Fastayrðing lykkju

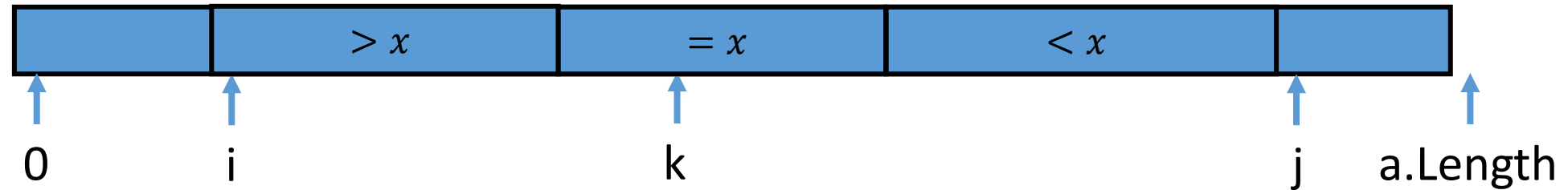


Helmingunarleit að einhverju sæti = x í minnkandi runu

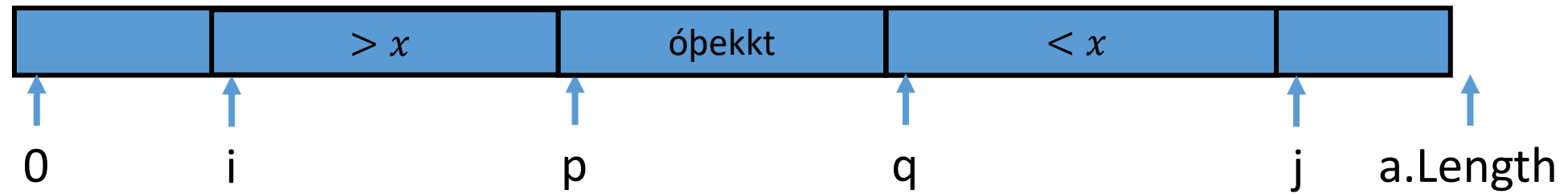
Forskilyrði



Eftirskilyrði (ef x er til)

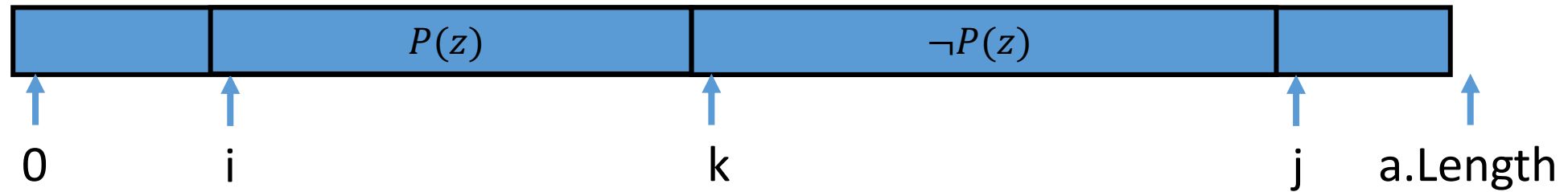


Fastayrðing lykkju

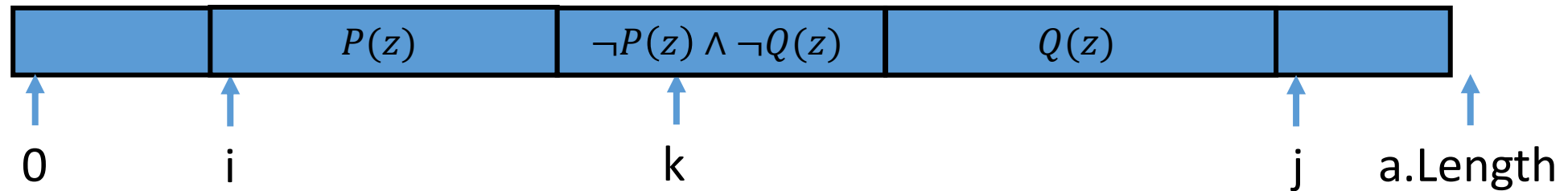


Almennu tilvikin

- Flokka má helmingunarleitarvandamálin í tvö almenn tilvik samkvæmt eftirskilyrðum
- Eftirskilyrði í einnar spurningar helmingunarleit



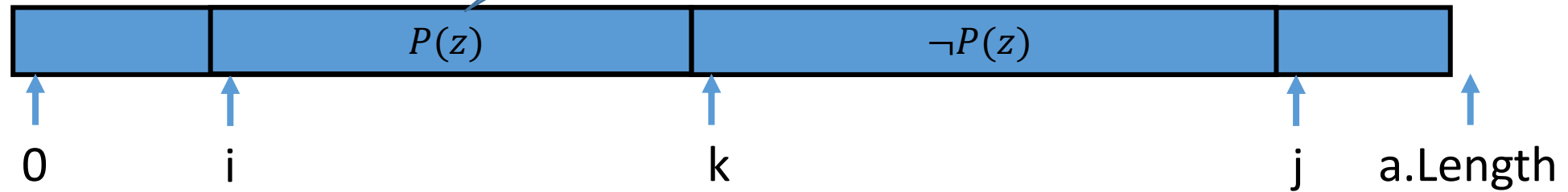
- Eftirskilyrði í tveggja spurninga helmingunarleit (ef til er k þ.a. ...)



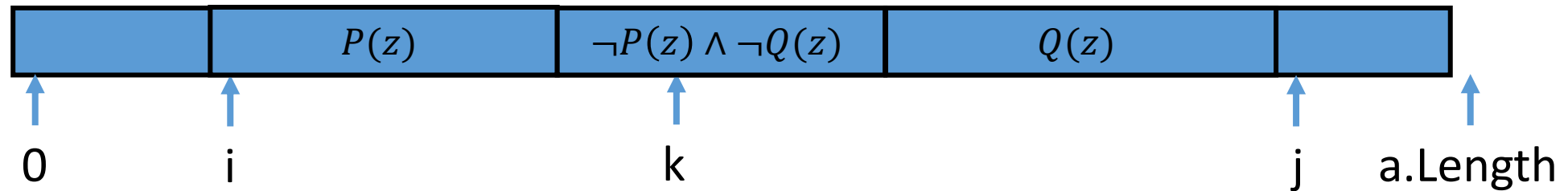
Almennu tilvikin

- Flokka má helmingunarleita í tvö almenn tilvik samkvæmt eftirskilyrðum
- Eftirskilyrði í einnar spurningar helmingunarleit

Dæmi:
 $P(z) \Leftrightarrow z < x$

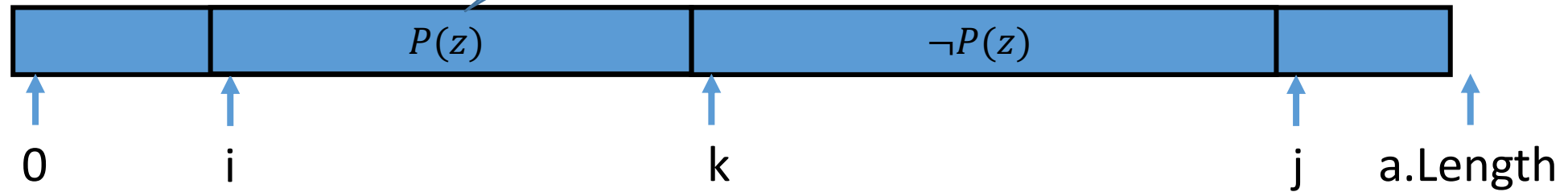


- Eftirskilyrði í tveggja spurninga helmingunarleit (ef til er k þ.a. ...)

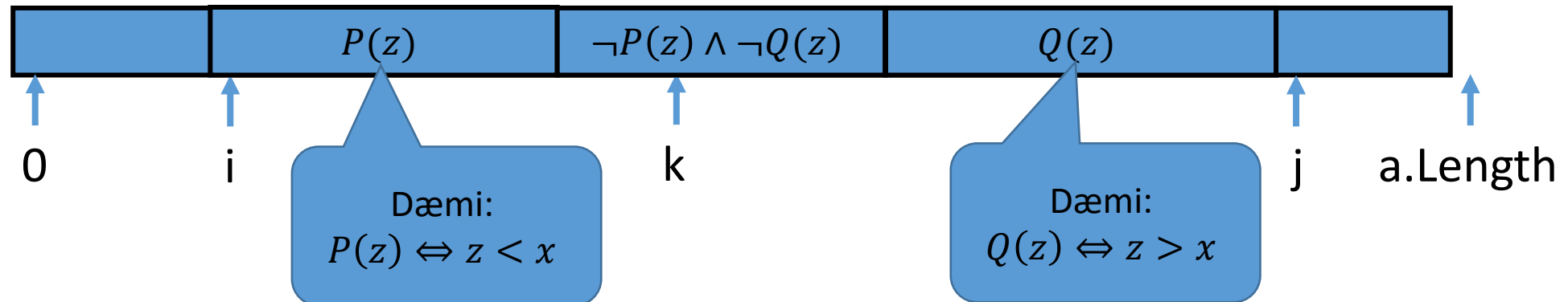


Almennu tilvikin

- Flokka má helmingunarleita í tvö almenn tilvik samkvæmt eftirskilyrðum
- Eftirskilyrði í einnar spurningar helmingunarleit



- Eftirskilyrði í tveggja spurninga helmingunarleit (ef til er `k` þ.a. ...)

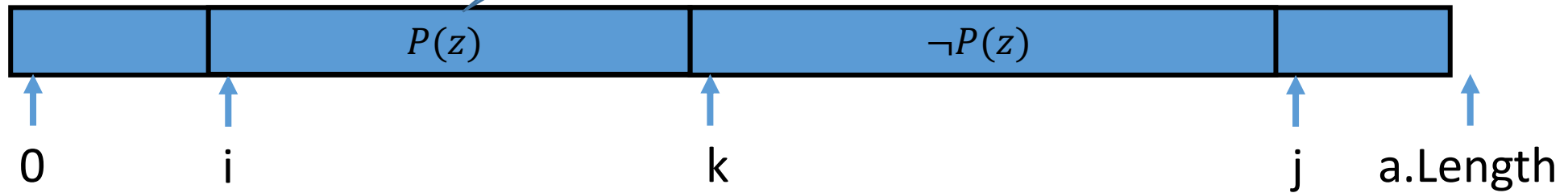


Almennu tilvikin

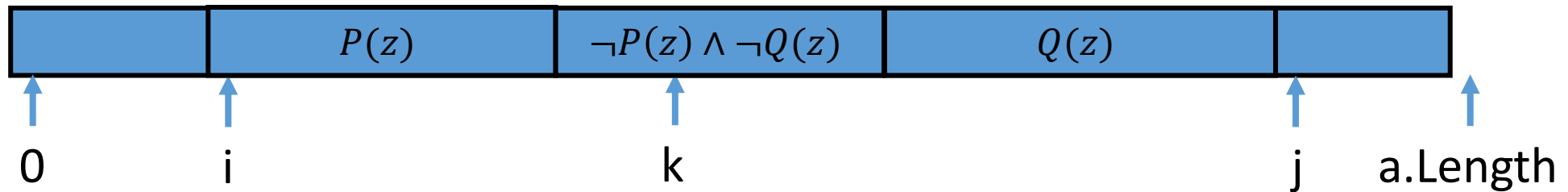
- Flokka má helmingunarleita í tvö almenn tilvik samkvæmt eftirskilyrðum
- Eftirskilyrði í einnar spurningar helmingunarleit

Annað dæmi:

$$P(z) \Leftrightarrow z \bmod 2 = 0$$

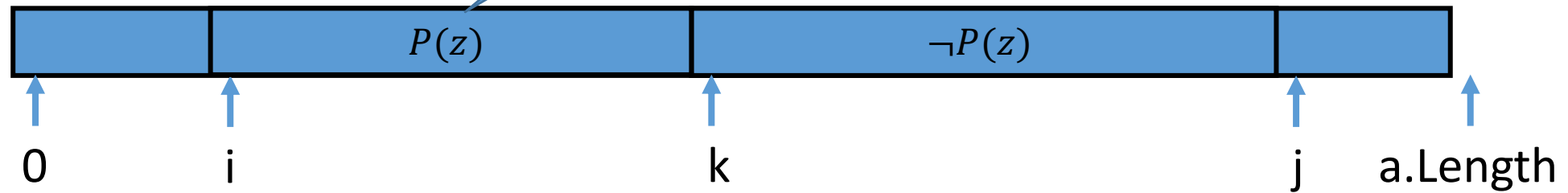


- Eftirskilyrði í tveggja spurninga helmingunarleit (ef til er k þ.a. ...)

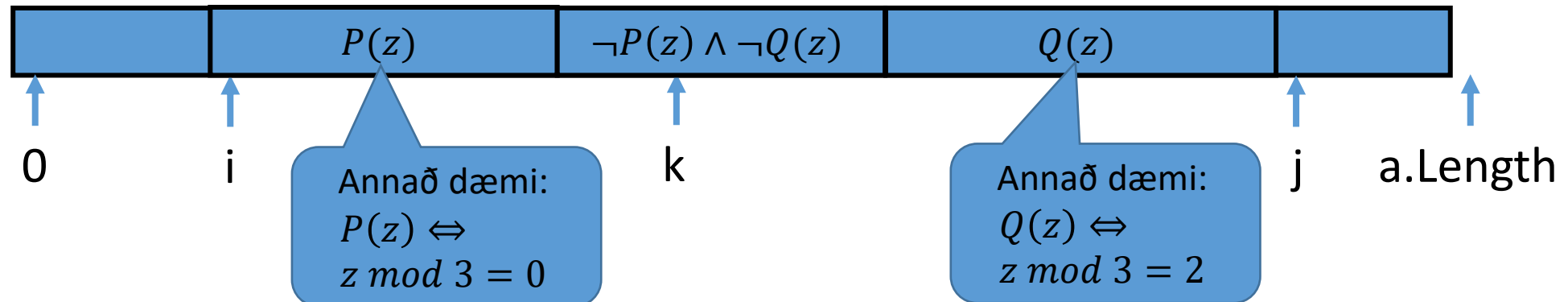


Almennu tilvikin

- Flokka má helmingunarleita í tvö almenn tilvik samkvæmt eftirskilyrðum
- Eftirskilyrði í einnar spurningar helmingunarleit



- Eftirskilyrði í tveggja spurninga helmingunarleit (ef til er `k` þ.a. ...)

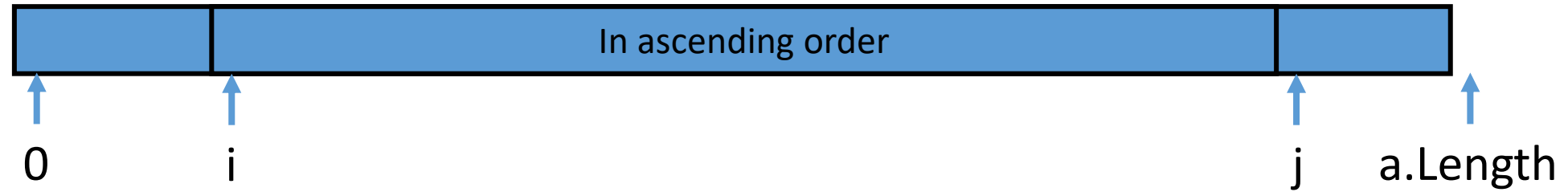


Loop Invariants of Binary Search

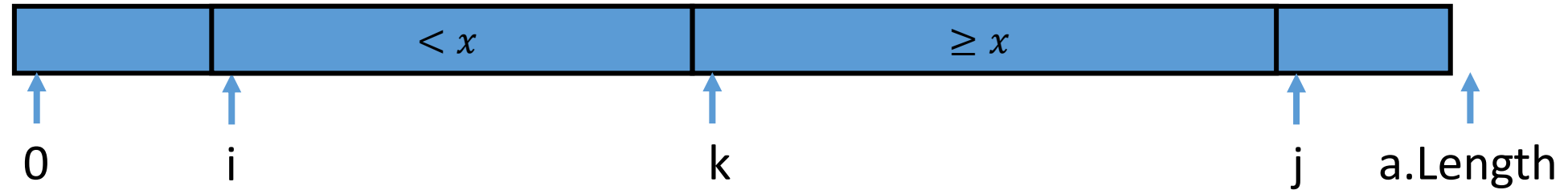
snorri@hi.is

Search for first position $\geq x$ in ascending array

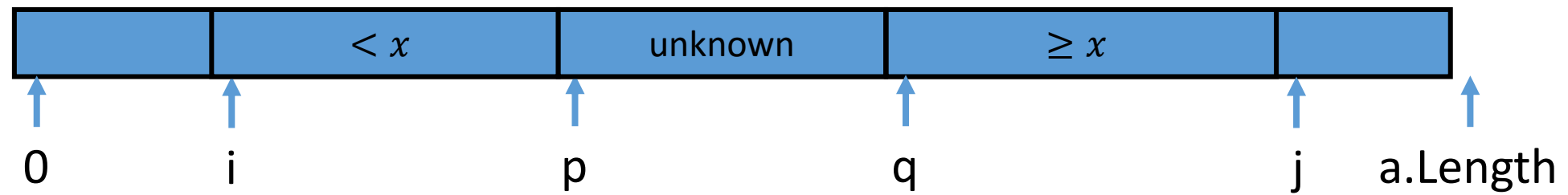
Precondition



Postcondition

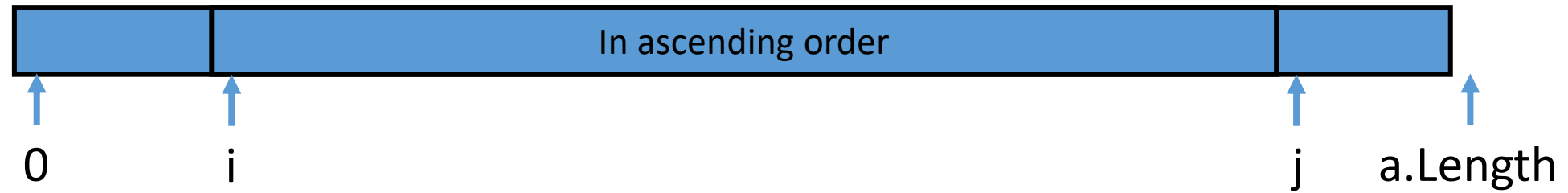


Loop Invariant

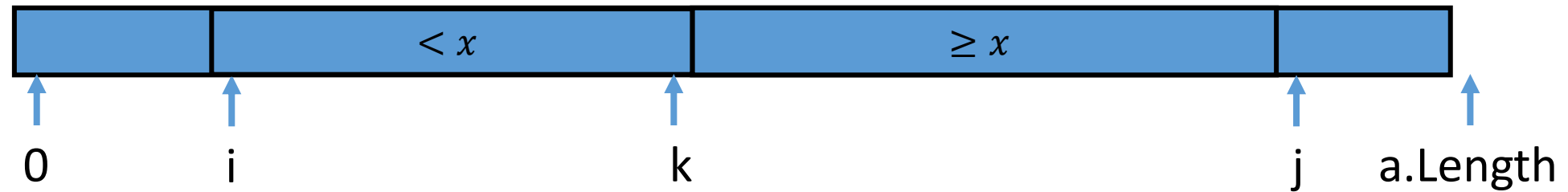


Search for last position $< x$ in ascending array

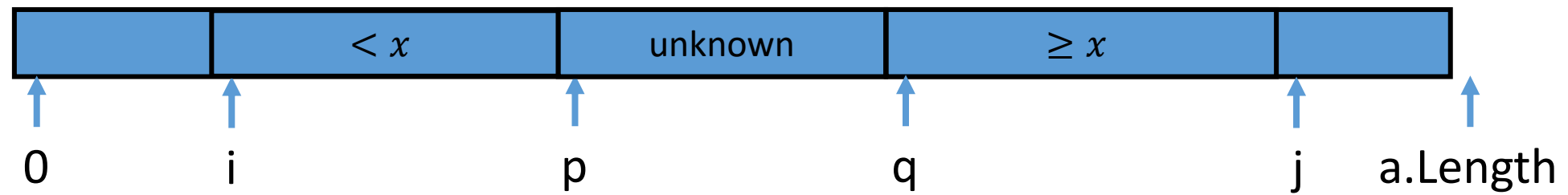
Precondition



Postcondition

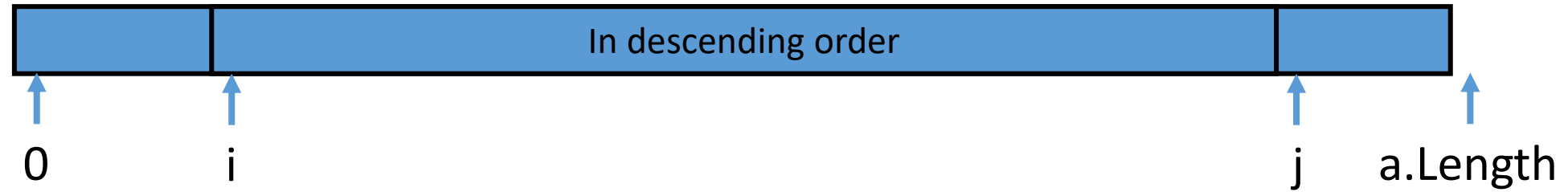


Loop Invariant

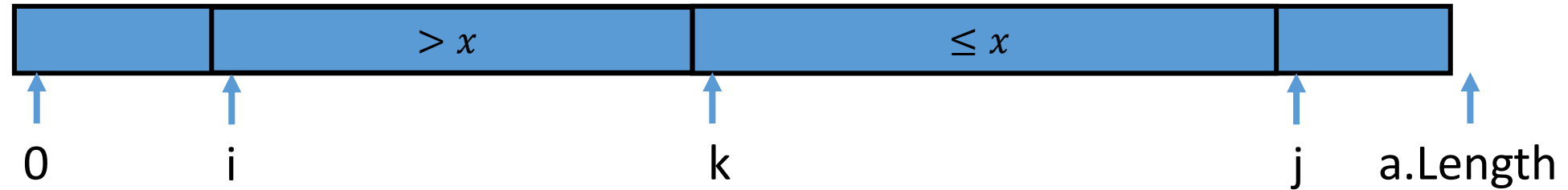


Search for first position $\leq x$ in descending array

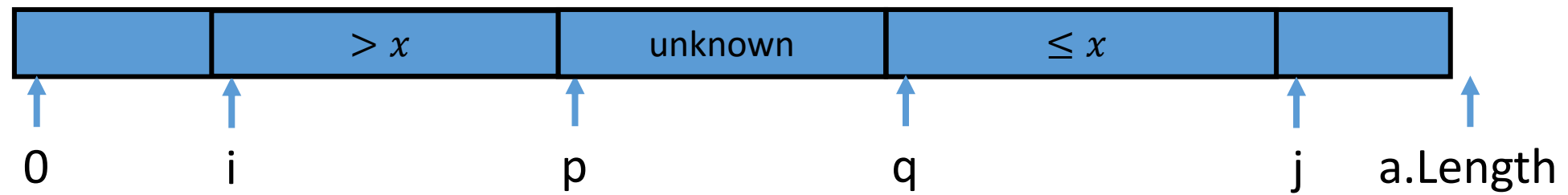
Precondition



Postcondition

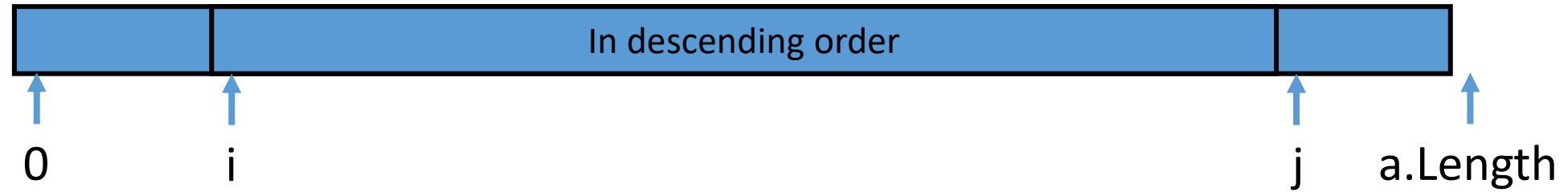


Loop Invariant



Search for last position $> x$ in descending array

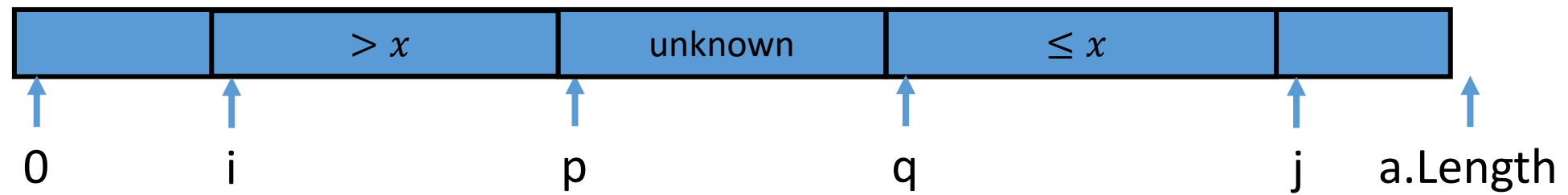
Precondition



Postcondition

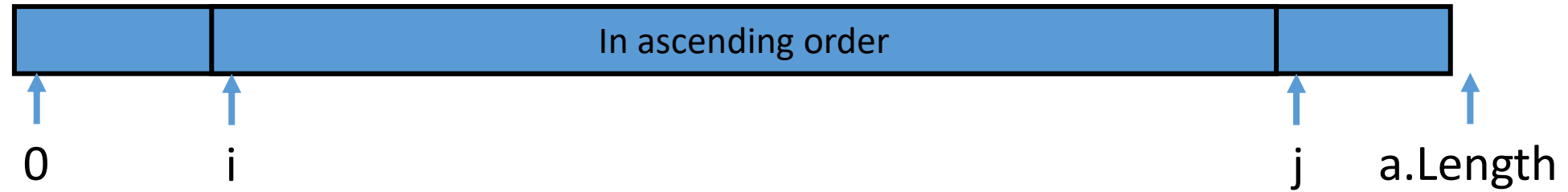


Loop Invariant

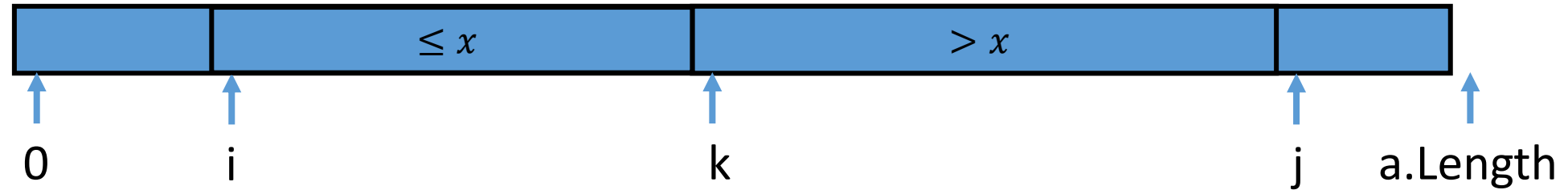


Search for first position $> x$ in ascending array

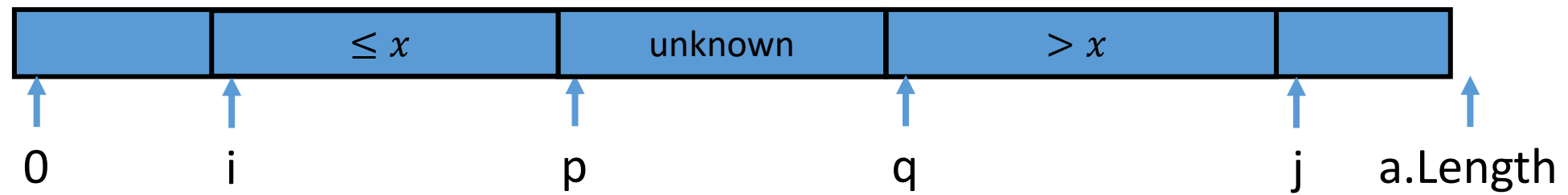
Precondition



Postcondition

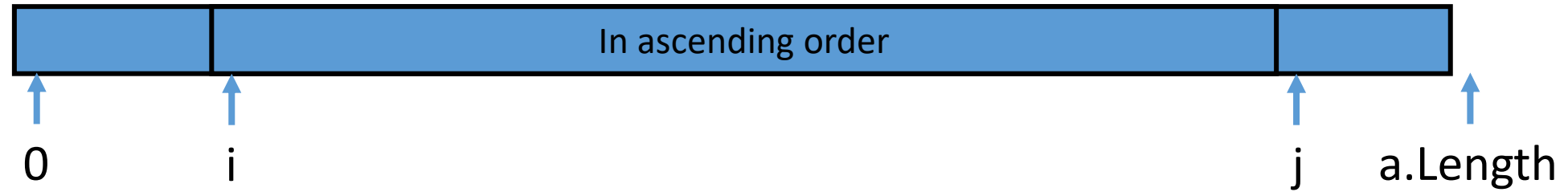


Loop Invariant

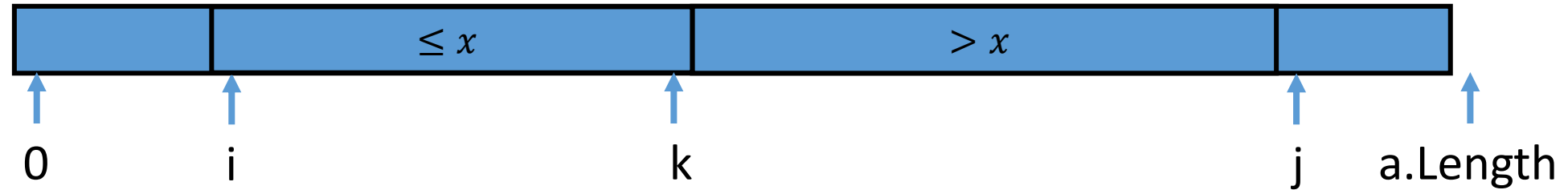


Search for last position $\leq x$ in ascending array

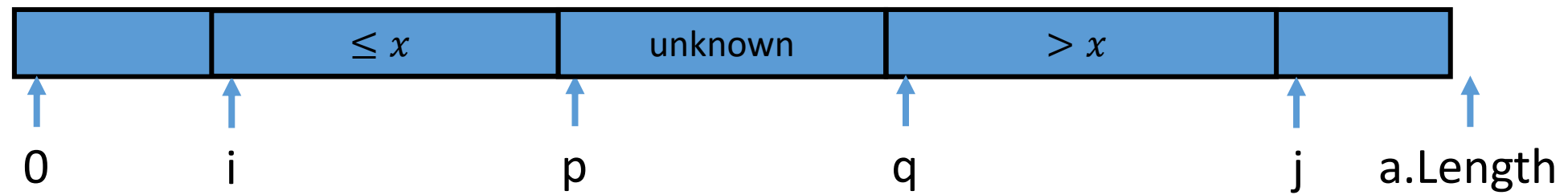
Precondition



Postcondition

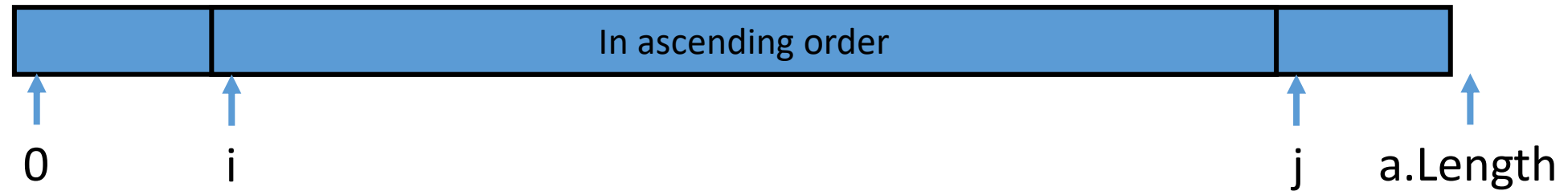


Loop Invariant

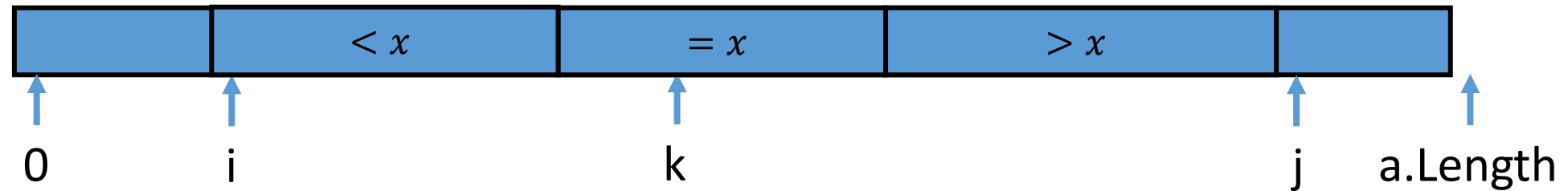


Search for some position $= x$ in ascending array

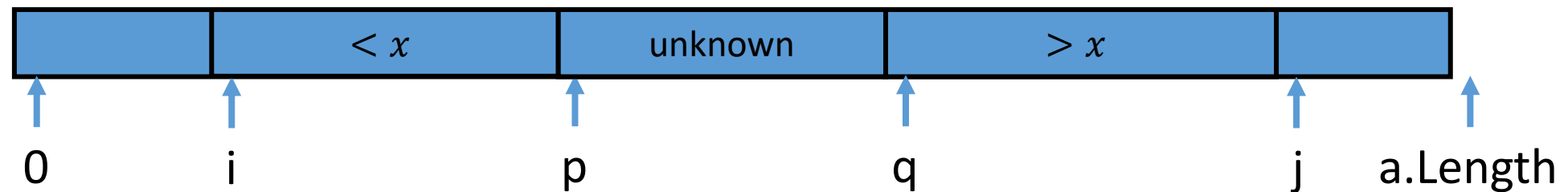
Precondition



Postcondition (if x exists)

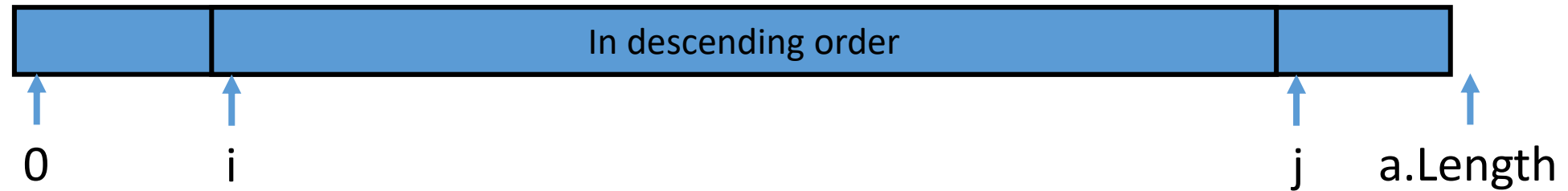


Loop Invariant

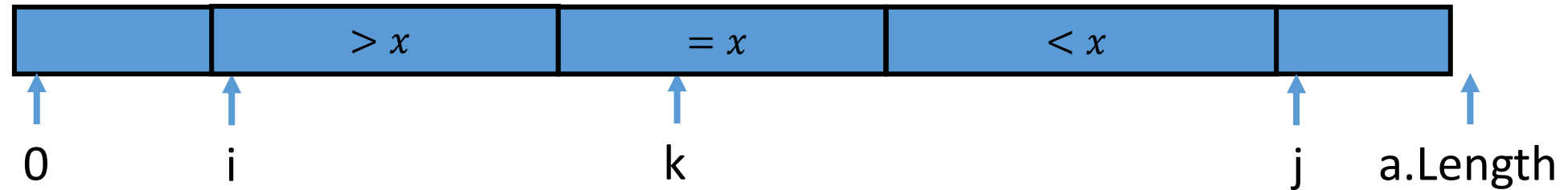


Search for some position $= x$ in descending array

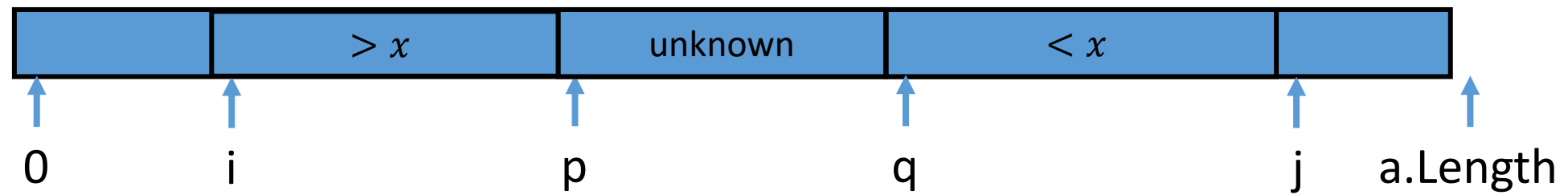
Precondition



Postcondition (if x exists)

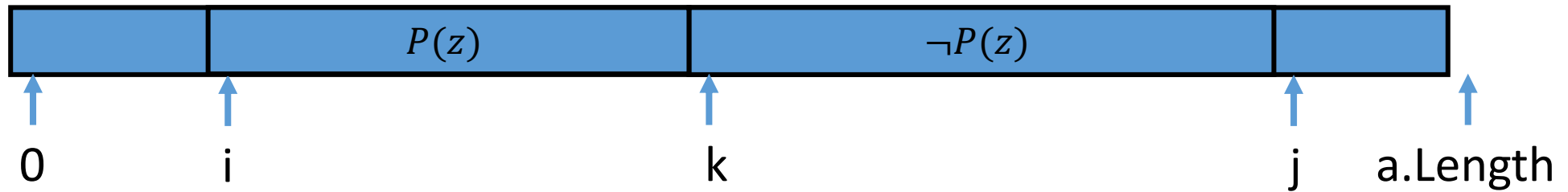


Loop Invariant

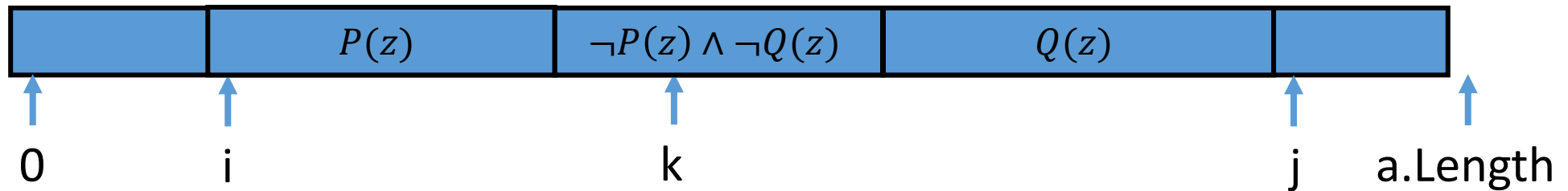


General Variants

- Binary search problems can be categorized into two general classes according to the postconditions
- Postcondition in one question binary search



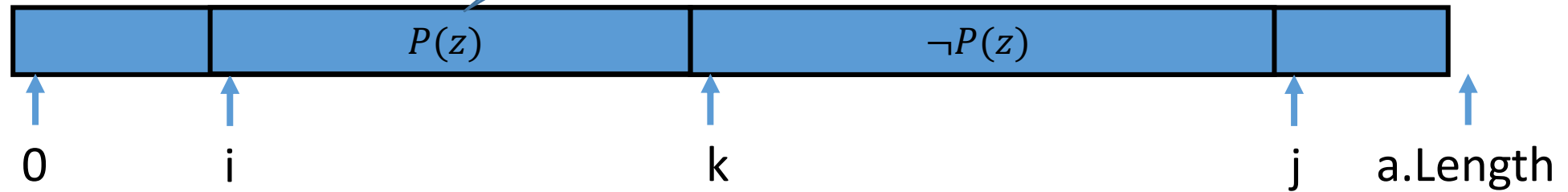
- Postcondition in two question binary search (if k exists such that...)



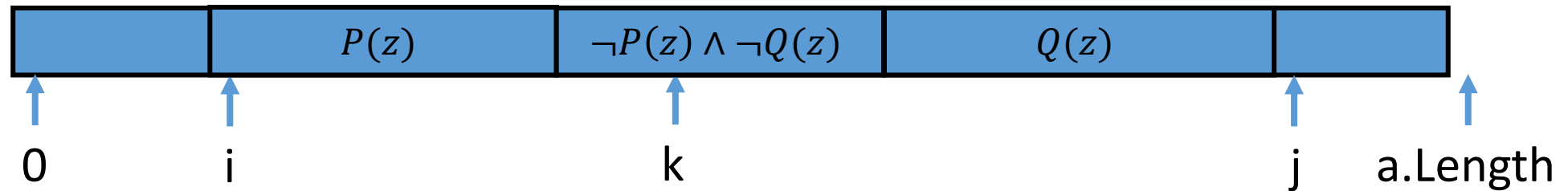
General Variants

- Binary search problems can be divided into two general classes according to the postcondition
- Postcondition in one question binary search

Example:
 $P(z) \Leftrightarrow z < x$

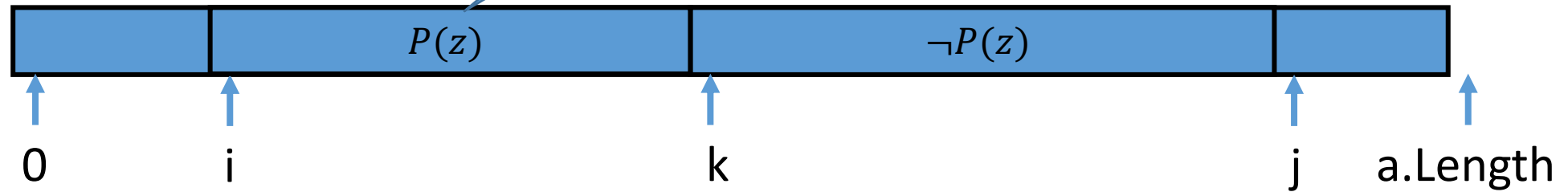


- Postcondition in two question binary search (if `k` exists such that...)

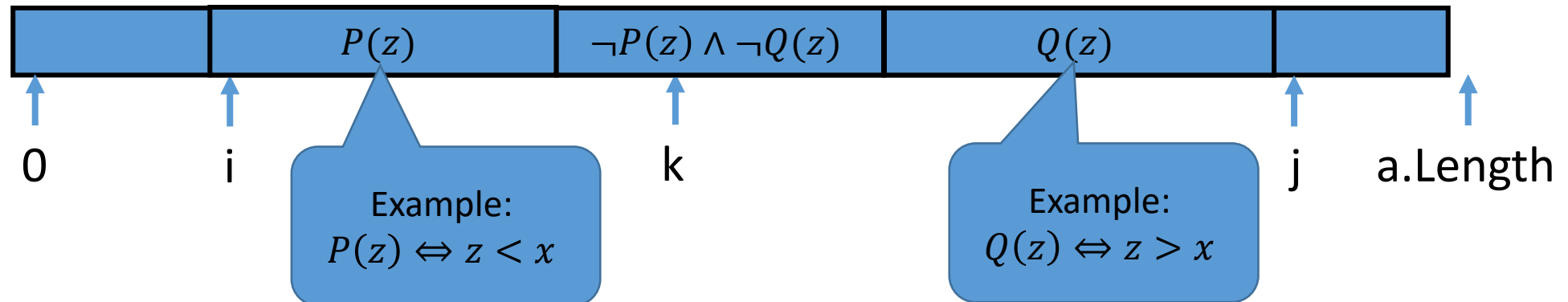


General Variants

- Binary search problems can be categorized into two general classes according to the postcondition.
- Postcondition in one question binary search



- Postcondition in two question binary search (if `k` exists such that...)

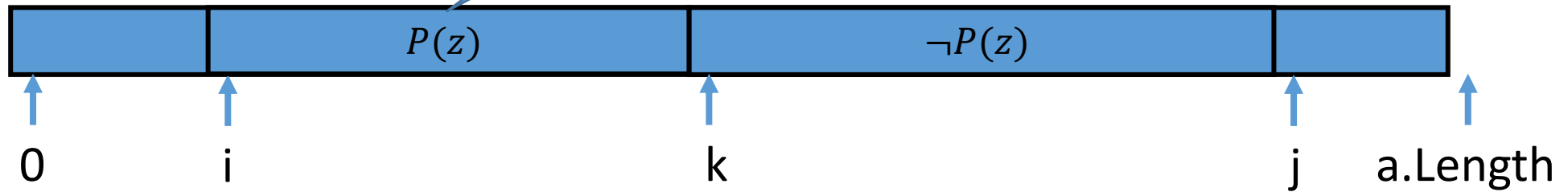


General Variants

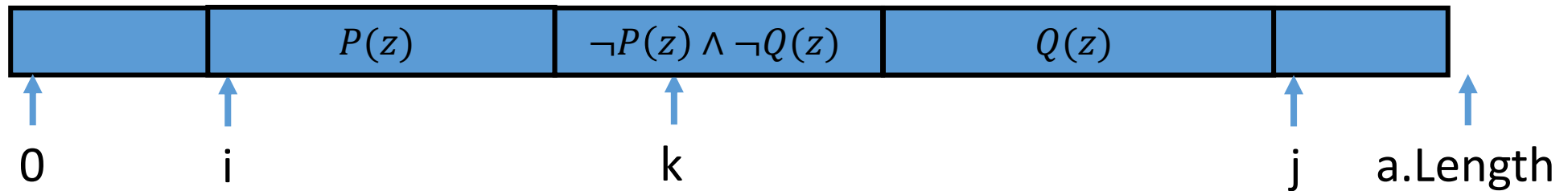
- Binary search problems can be divided into two general classes according to the postcondition
- Postcondition in one question binary search

Another example:

$$P(z) \Leftrightarrow z \bmod 2 = 0$$

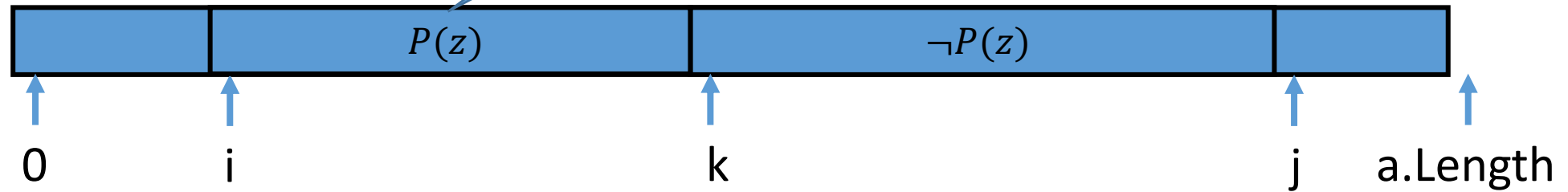


- Postcondition in two question binary search (if `k` exists such that...)



General Variants

- Binary search problems can be divided into two general classes according to the postcondition
- Postcondition in one question binary search



- Postcondition in two question binary search (if `k` exists such that...)

