Data Structure and Algorithm Queue

Queue Data Structure

A Data Structure where data are queued it follows the principle.

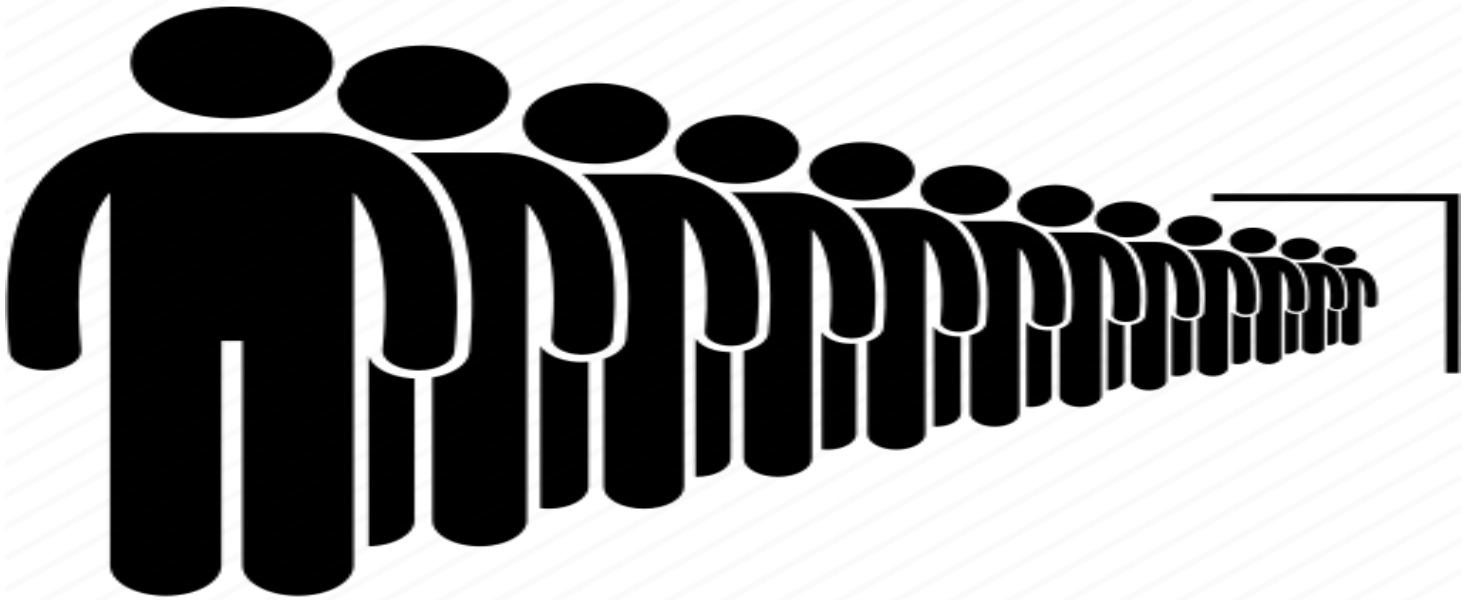
FI-FO (First in – First Out)
LI-LO (Last in – Last Out)

Queue Data Structure

A Limitation to the Queue Data Structure is that Empty spaces will not be filled again until the queue is empty

Queue Data Structure

Real Life Application



Queue Data Structure

Once the queue is filled you cannot add to a queue until it is empty again.

Queue Data Structure

Software Application

Monitor / TV (*Optional)

QMS Software

Thermal Receipt Printer

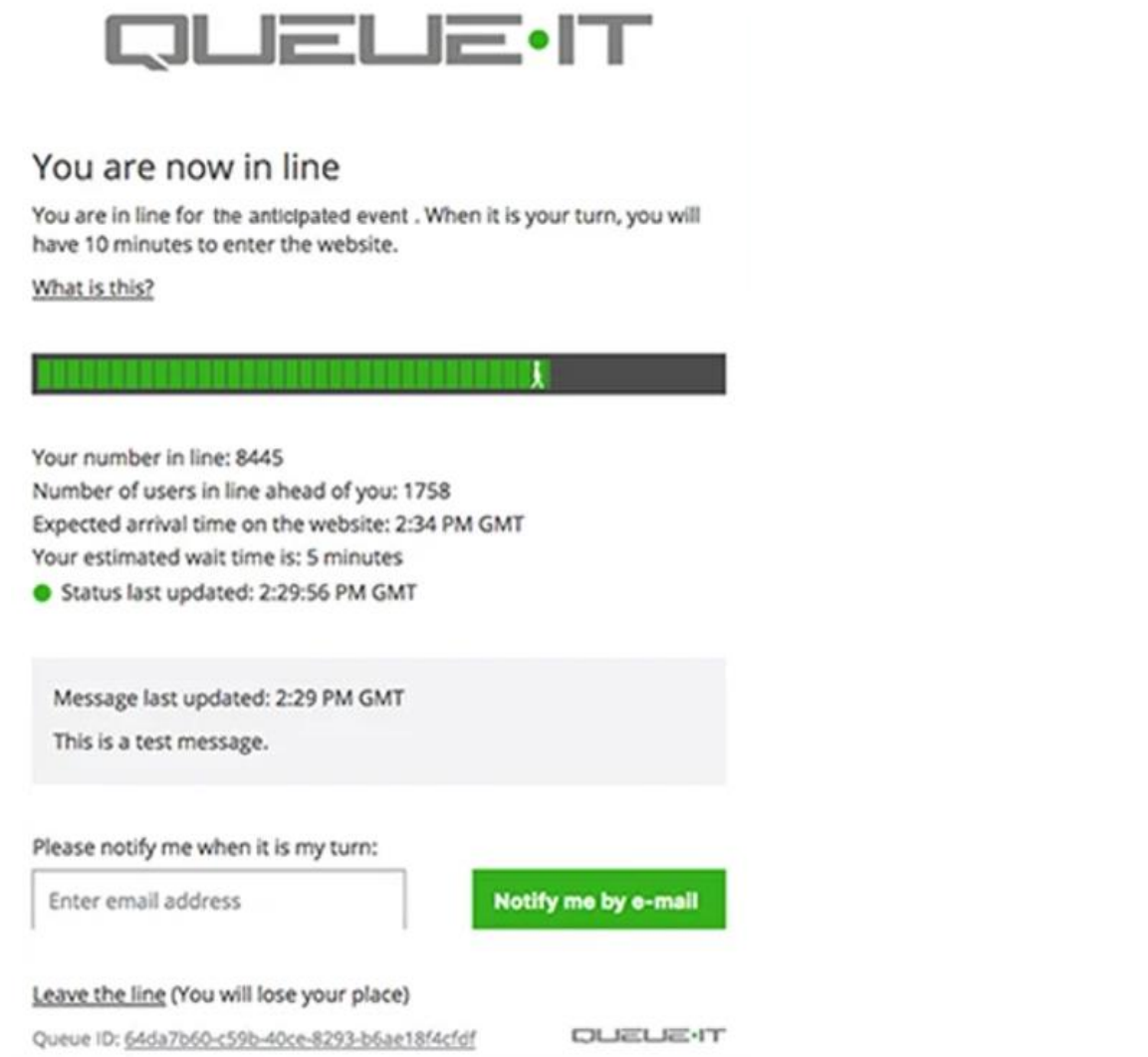
QN100 5" Touch Screen

QD100

P901 (Calling Station)

Queue Data Structure

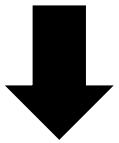
Software Application



Queue Data Structure

Empty Queue

front

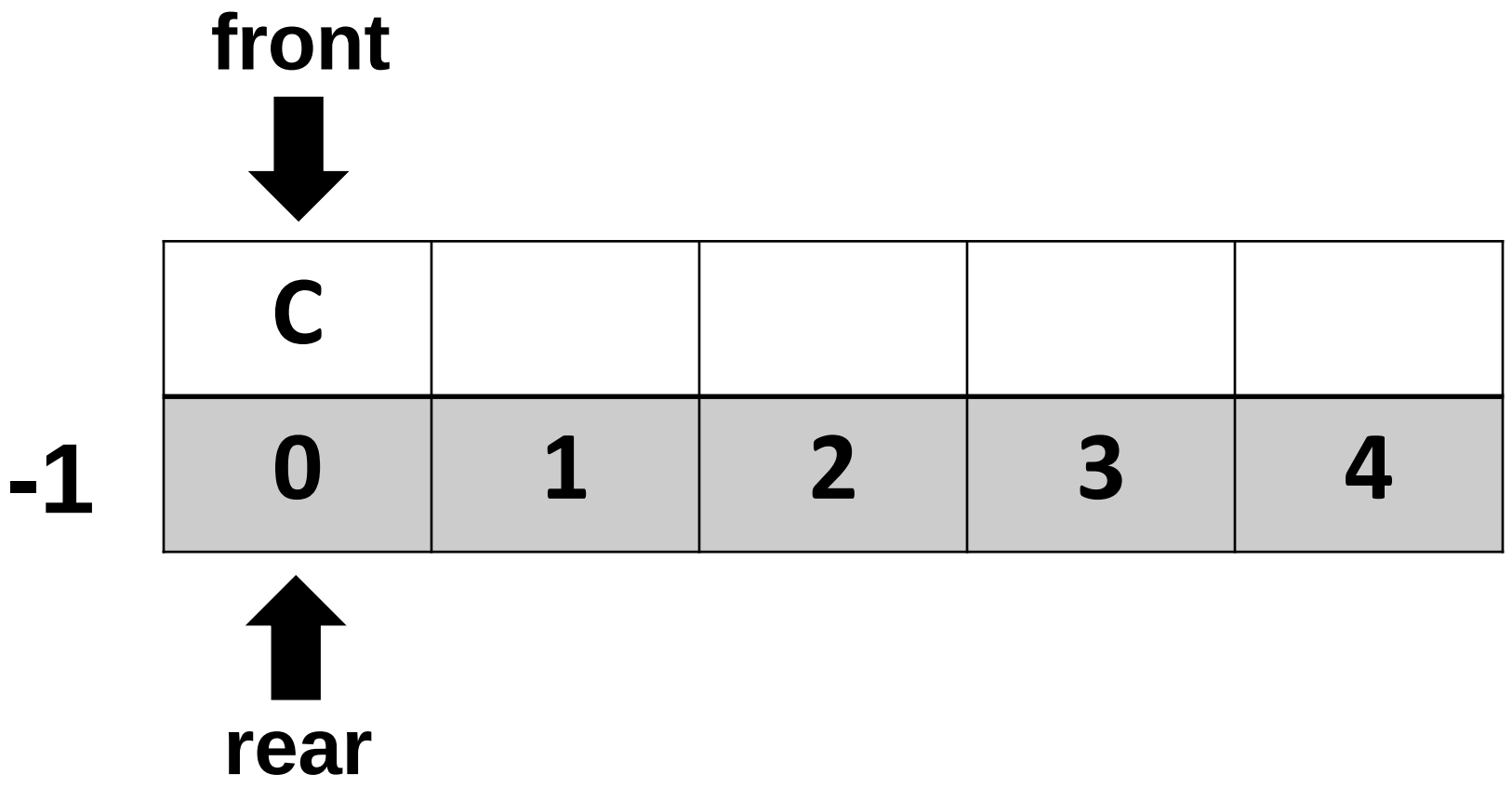


-1	0	1	2	3	4

rear

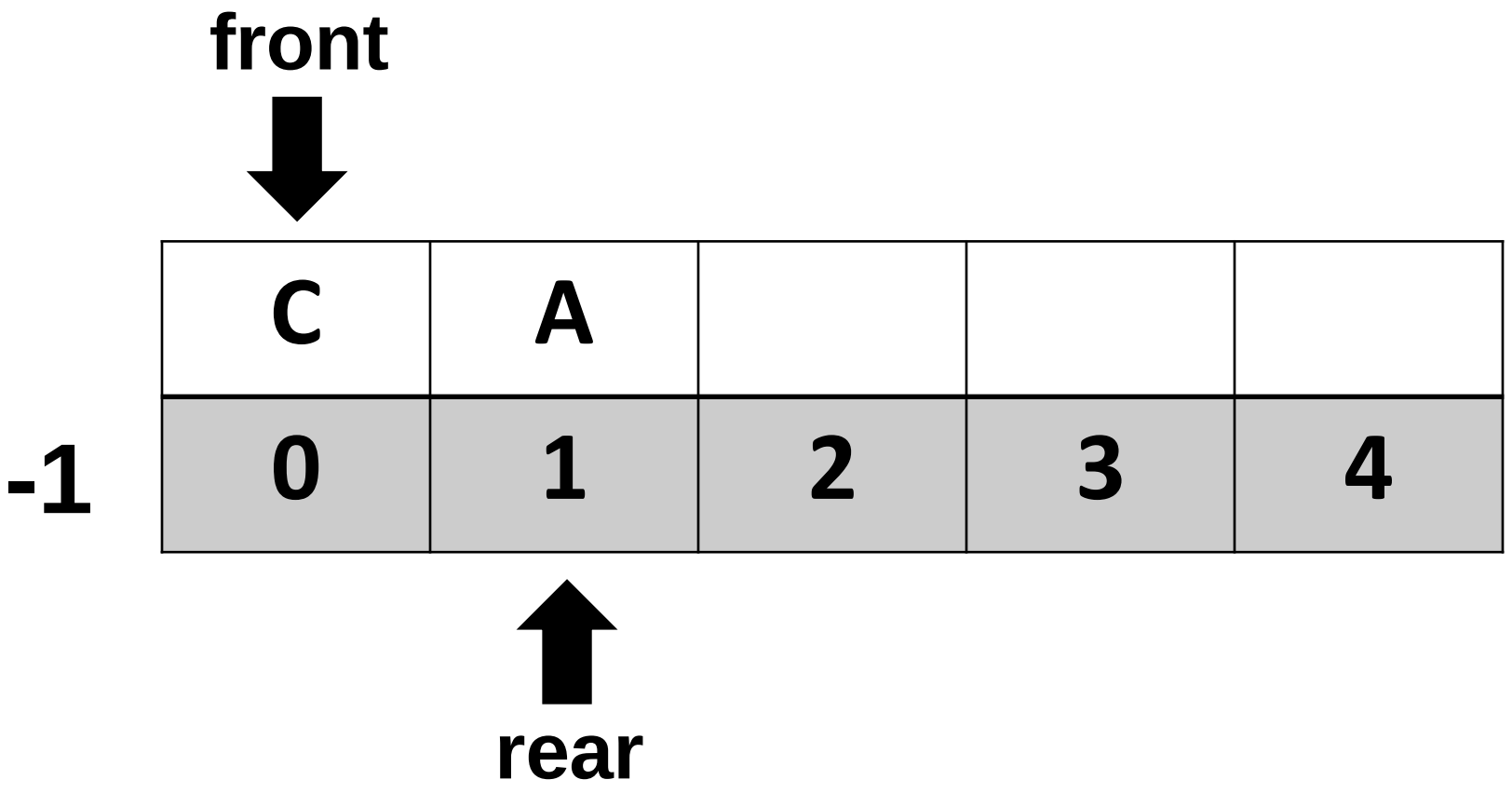
Queue Data Structure

Queue with Data



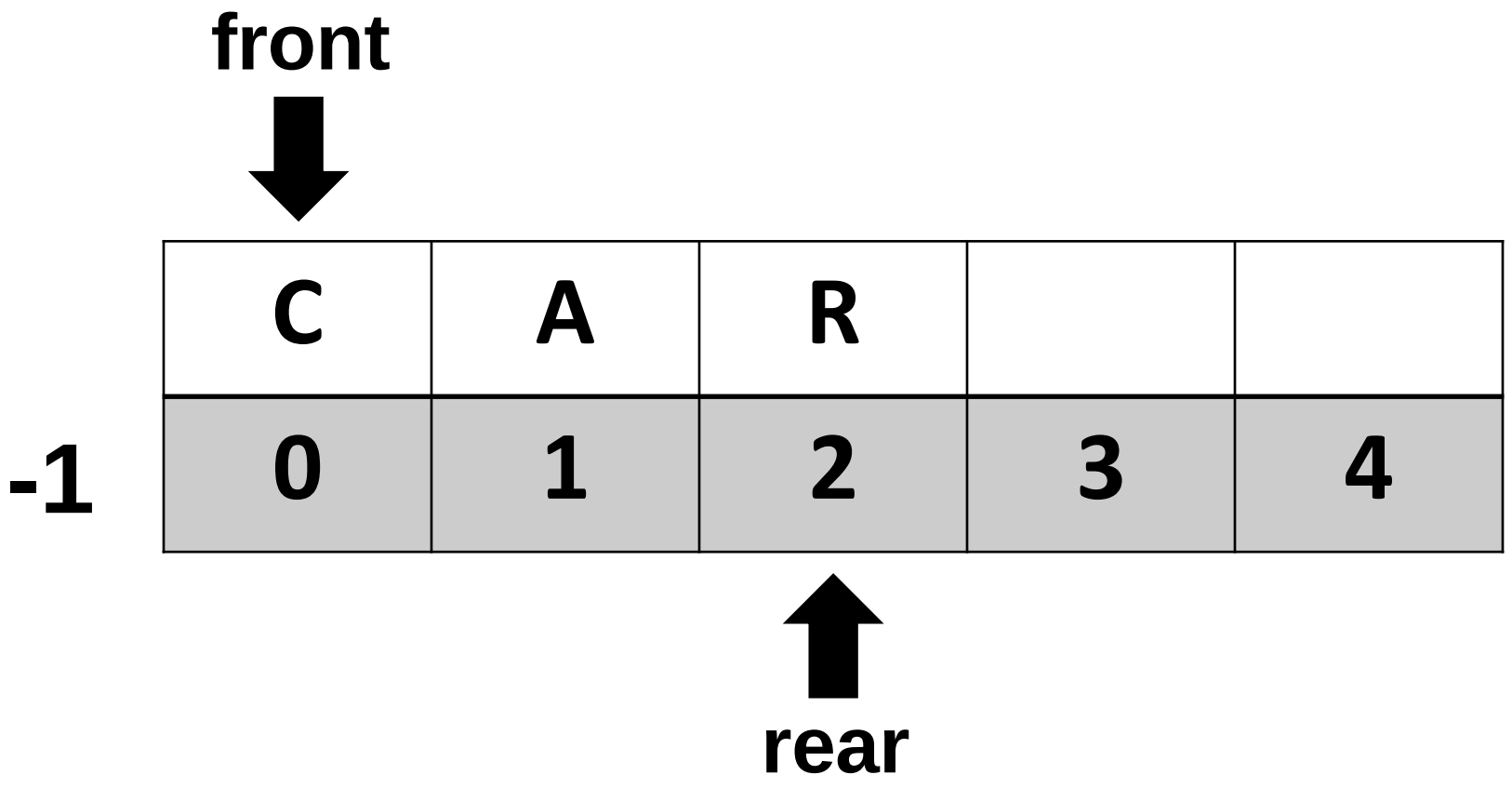
Queue Data Structure

Queue with Data



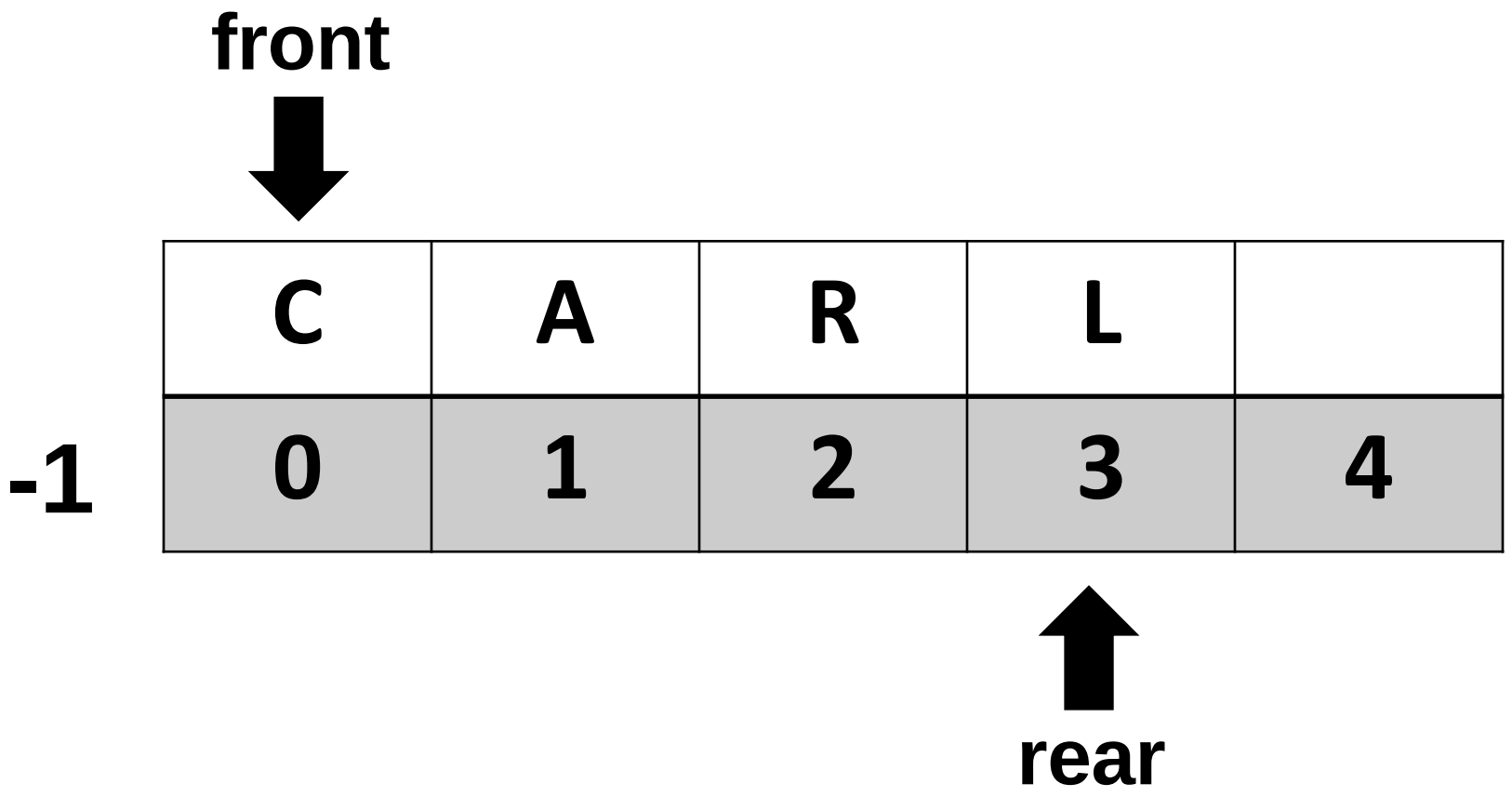
Queue Data Structure

Queue with Data



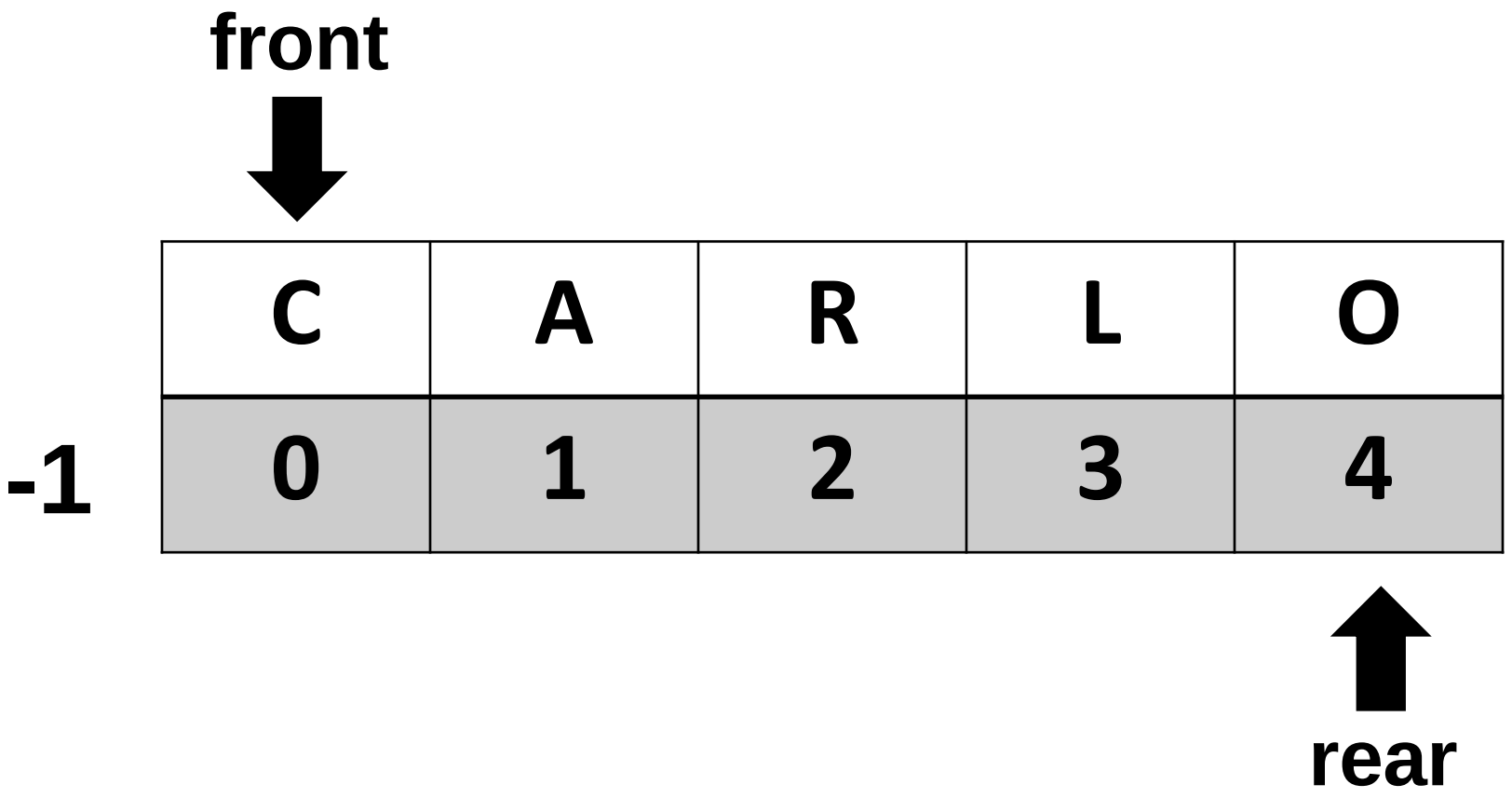
Queue Data Structure

Queue with Data



Queue Data Structure

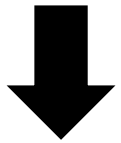
Full Queue



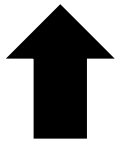
Queue Data Structure

Dequeuing

front



	A	R	L	O
-1	0	1	2	3	4



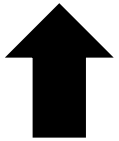
rear

Queue Data Structure

Dequeuing

front

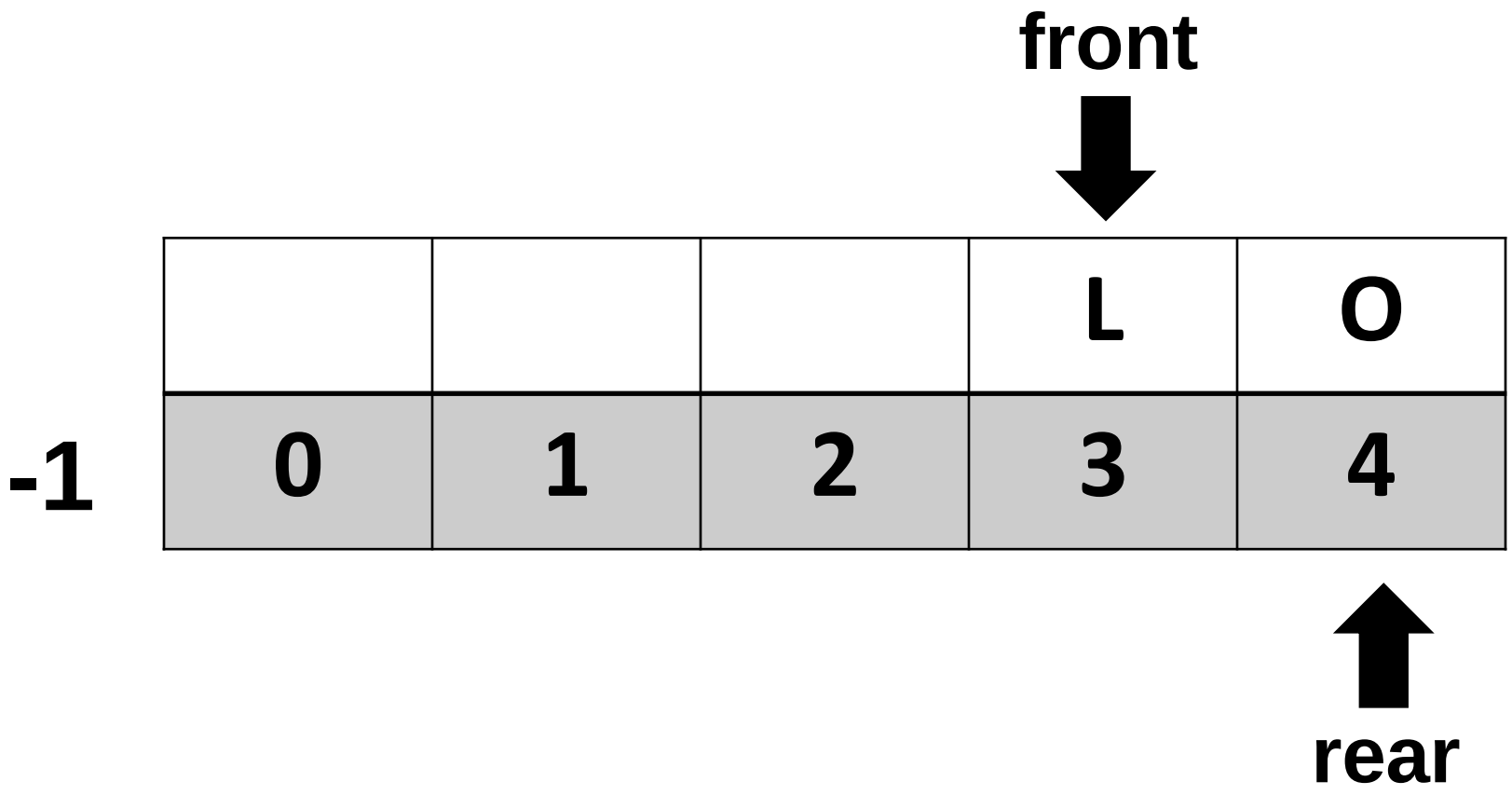
			R	L	O
-1	0	1	2	3	4



rear

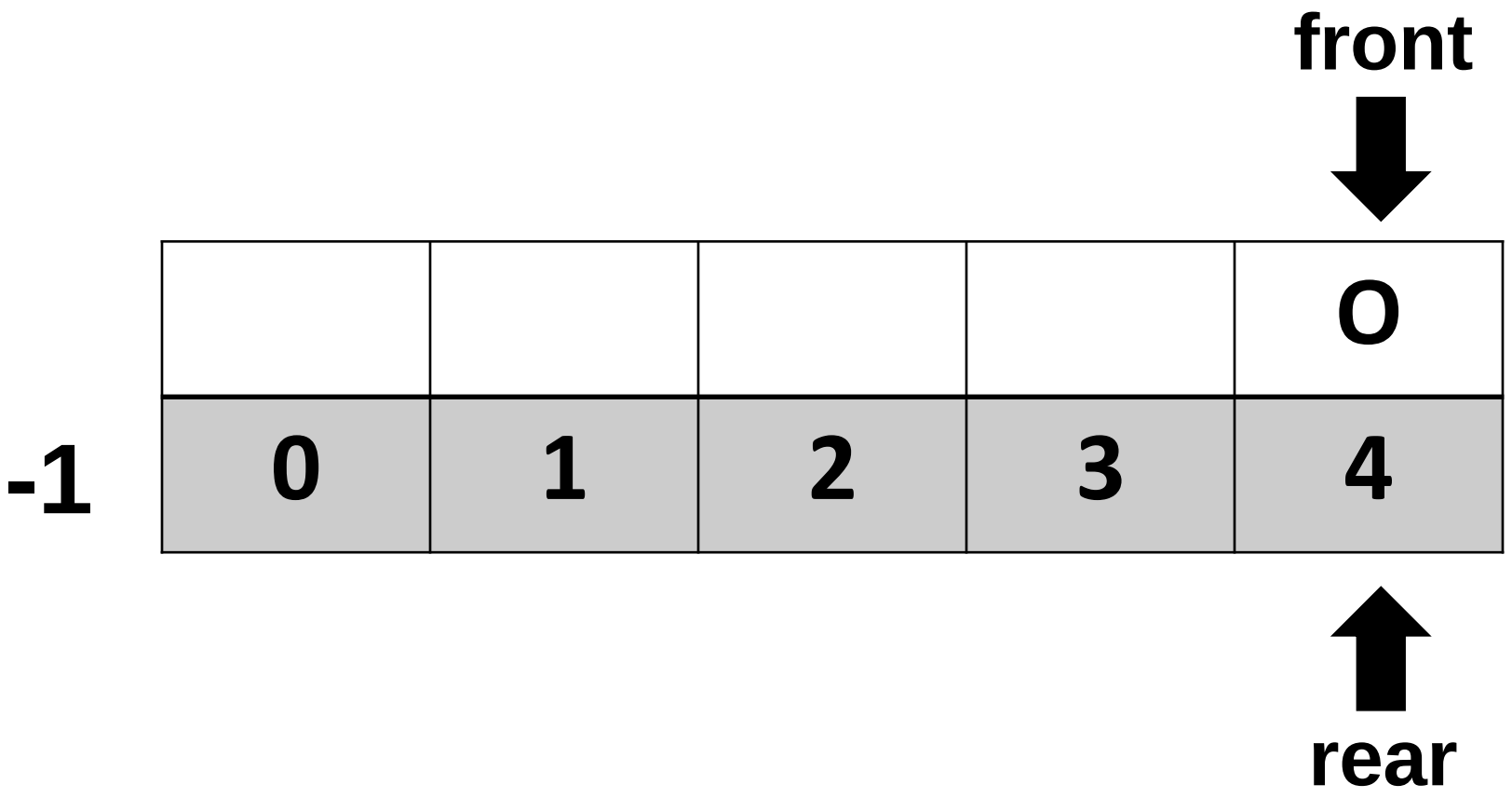
Queue Data Structure

Dequeuing



Queue Data Structure

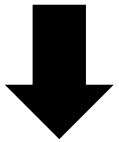
Dequeuing



Queue Data Structure

Empty Queue

front



rear

-1	0	1	2	3	4

Queue Operations

enqueue(x)

Inserts data on the rear of the queue.

dequeue()

Removes data on front of the queue.

Queue Data Structure

Queue Operations Example

Operations	front
dequeue()	
enqueue(C)	
enqueue(a)	-1
dequeue()	
dequeue()	rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations	front
dequeue()	
enqueue(C)	
enqueue(a)	-1
dequeue()	
dequeue()	rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

front

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()

-1

rear

0	1	2	3	4

Empty Queue

Queue Data Structure

Queue Operations Example

Operations

front

dequeue()

enqueue(C)

enqueue(a)

dequeue()

dequeue()

-1

rear

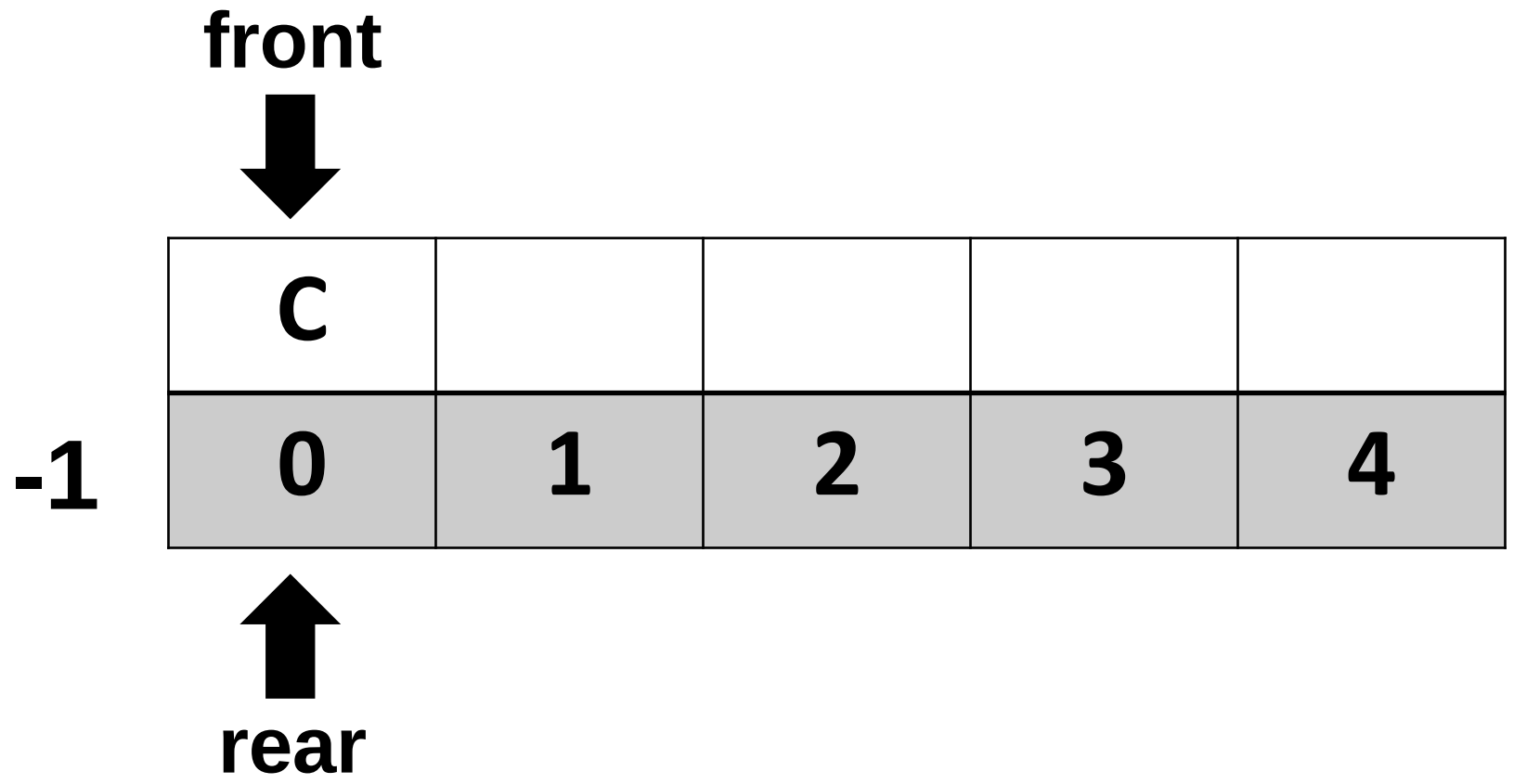
0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()



Queue Data Structure

Queue Operations Example

Operations

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()

front

C				
0	1	2	3	4

-1

rear

Queue Data Structure

Queue Operations Example

Operations

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()

front

-1

C	a			
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations		front				
		⬇				
dequeue()		C	a			
enqueue(C)						
enqueue(a)	-1	0	1	2	3	4
➡ dequeue()						
dequeue()			⬆			
			rear			

Queue Data Structure

Queue Operations Example

Operations

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()
dequeue()

-1

front

	a			
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

dequeue()
enqueue(C)
enqueue(a)
dequeue()
dequeue()

-1

front

	a			
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations	front
dequeue()	
enqueue(C)	
enqueue(a)	-1
dequeue()	
dequeue()	rear

0	1	2	3	4

Queue Operations

isEmpty()

Checks if queue is empty.

isFull()

Checks if queue is full.

Queue Operations

peek()

Returns the data at the front of the queue.

size()

Returns the size of the queue.

Queue Data Structure

Queue Operations Example

Operations
enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()

front

-1

rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

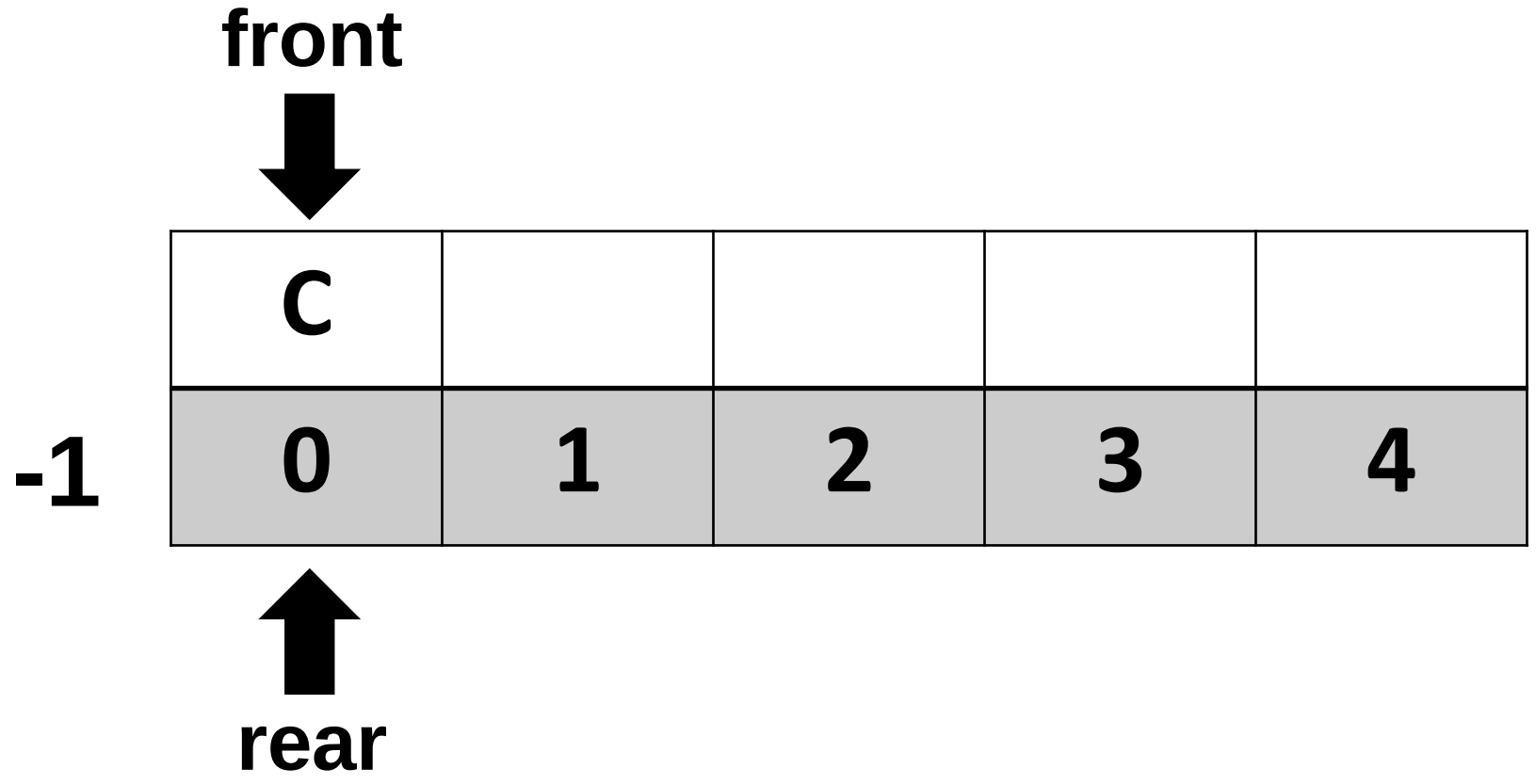
enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()



Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

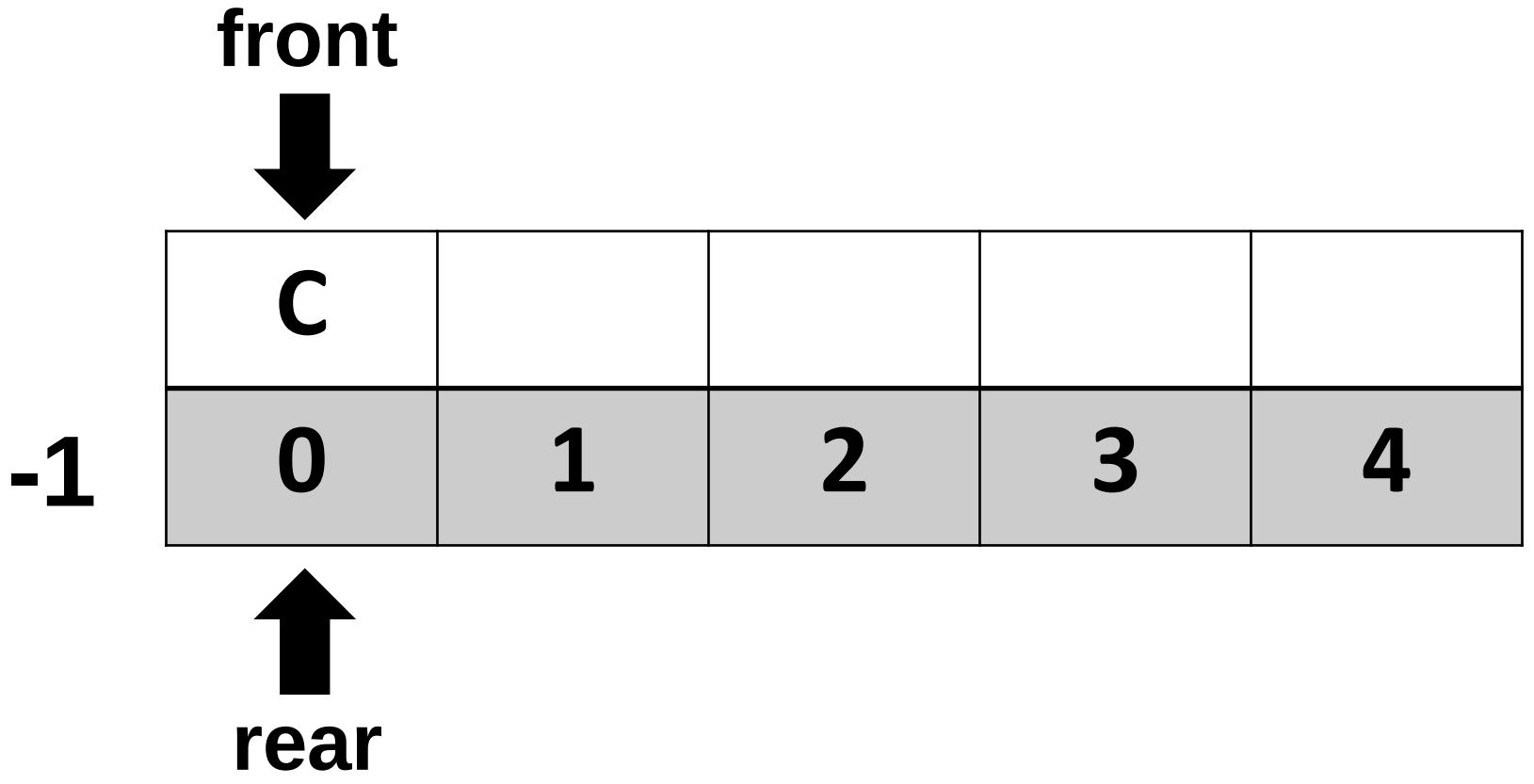
enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()



Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

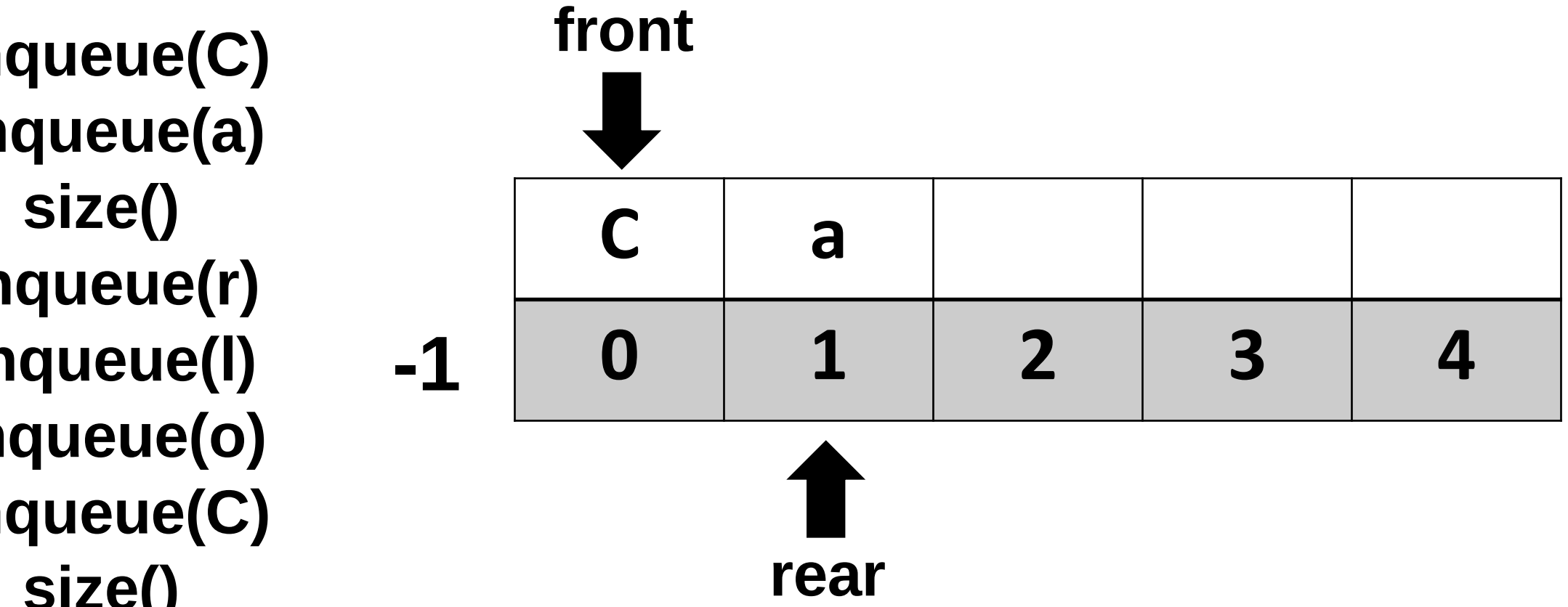
enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()



Queue Data Structure

Queue Operations Example

Operations
enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()

front

C	a			
0	1	2	3	4

-1

rear

Queue Data Structure

Queue Operations Example

Operations
enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()

front

C	a			
0	1	2	3	4

-1

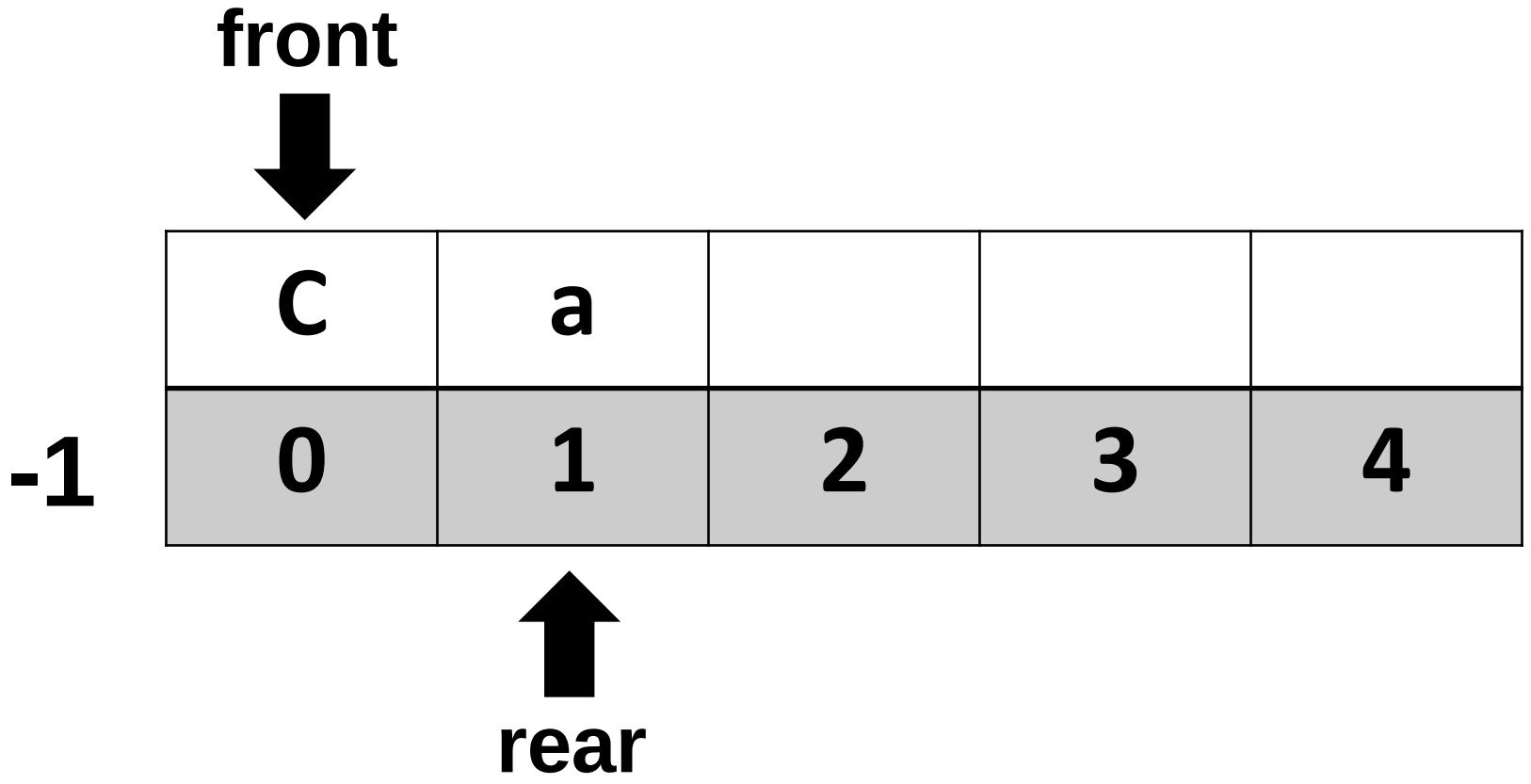
rear

Size = 2

Queue Data Structure

Queue Operations Example

Operations
enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()

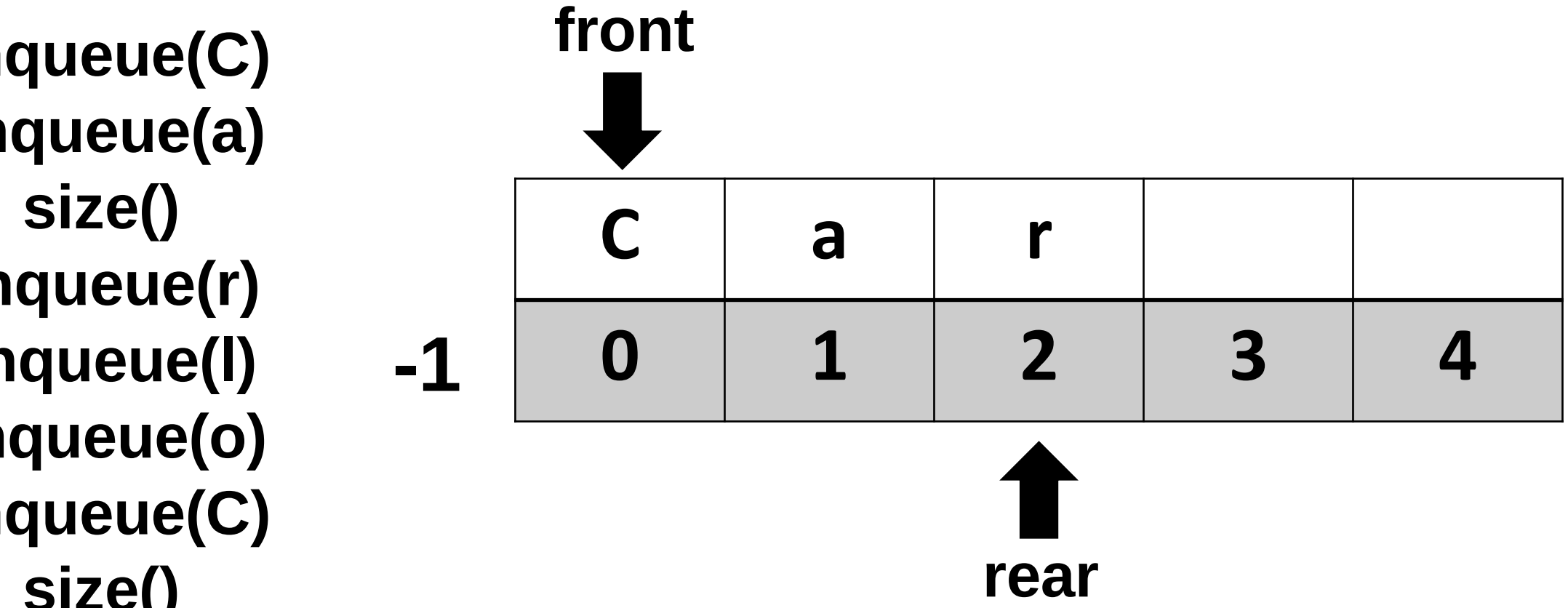


Queue Data Structure

Queue Operations Example

Operations

enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()



Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

➡ enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r		
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

➡ enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r	l	
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r	l	
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)
enqueue(a)
size()
enqueue(r)
enqueue(l)
enqueue(o)
enqueue(C)
size()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Full Queue

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

enqueue(r)

enqueue(l)

enqueue(o)

enqueue(C)

size()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

enqueue(C)

enqueue(a)

size()

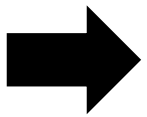
enqueue(r)

enqueue(l)

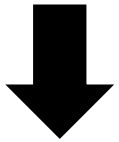
enqueue(o)

enqueue(C)

size()



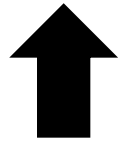
front



C	a	r	l	o
0	1	2	3	4

-1

Size = 5



rear

Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

C	a	r	l	o
0	1	2	3	4

-1

True

rear

Queue Data Structure

Queue Operations Example

Operations

isFull()

➡ dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

-1

C	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

isFull()

➡ dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

-1

	a	r	l	o
0	1	2	3	4

rear

Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

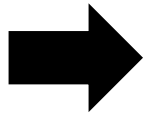
dequeue()

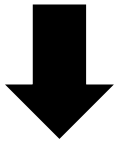
dequeue()

dequeue()

dequeue()

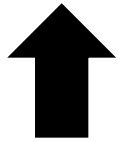
isEmpty()





	a	r	l	o
0	1	2	3	4

-1



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

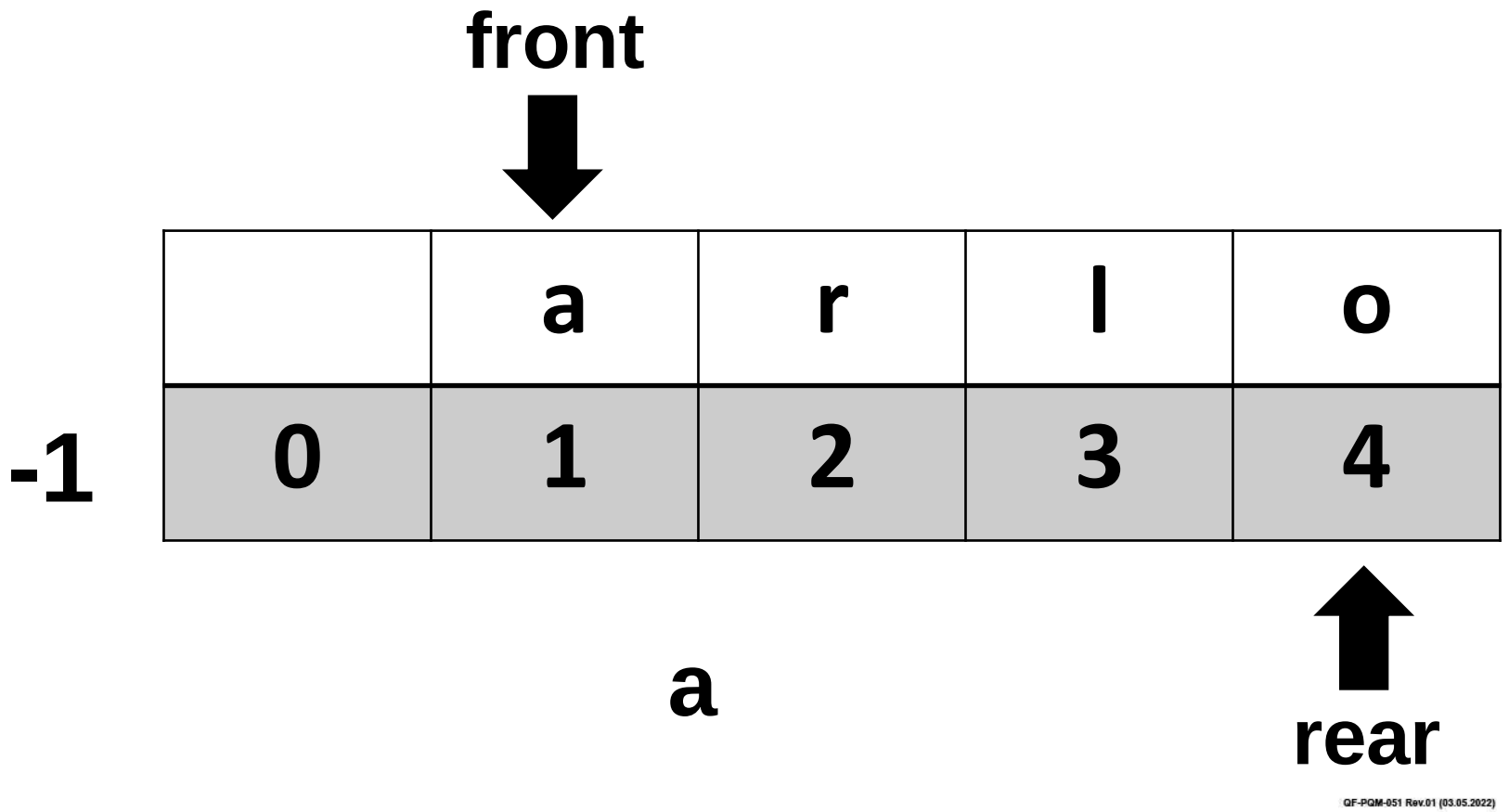
dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

-1

	a	r	l	o
0	1	2	3	4

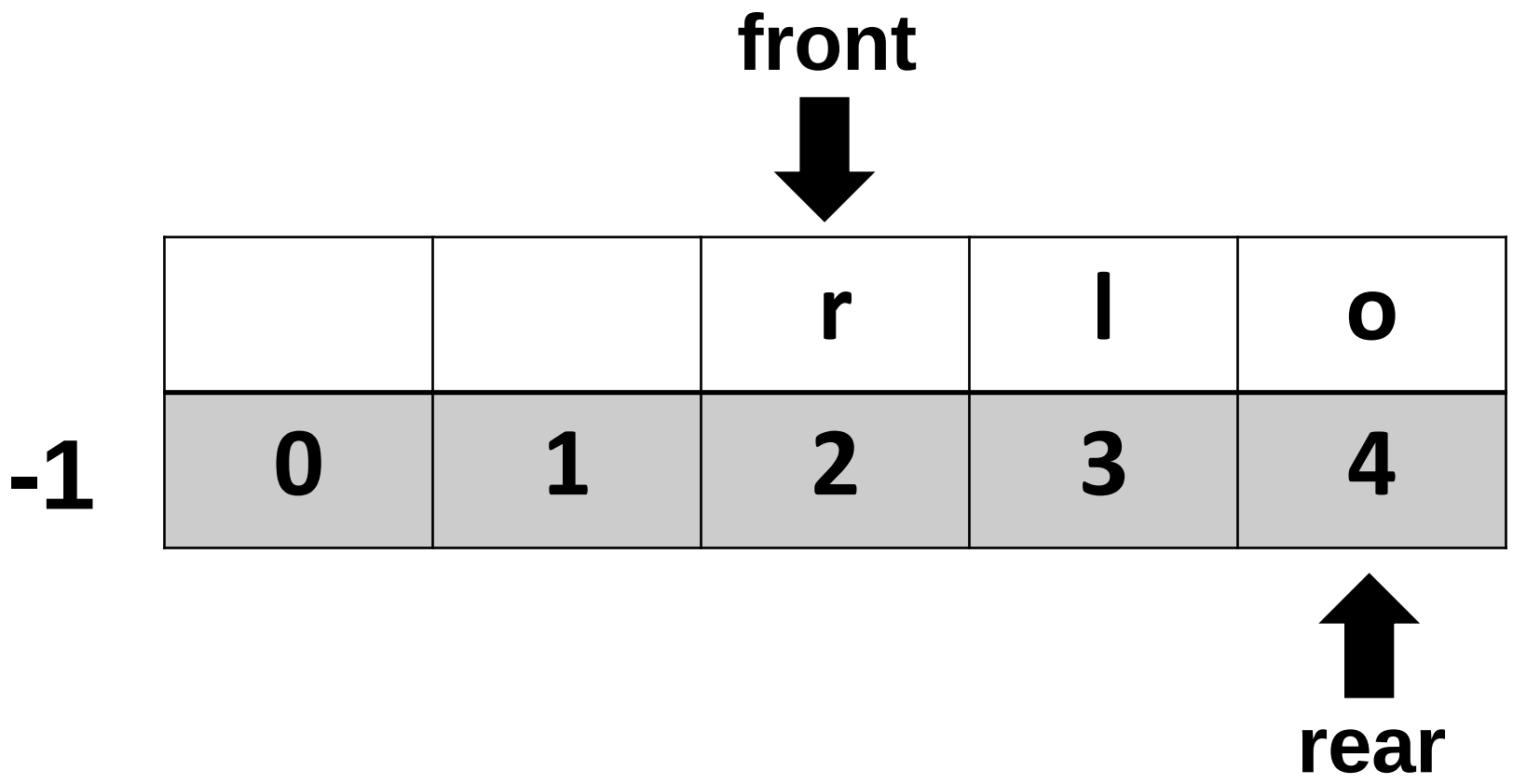
a

rear

Queue Data Structure

Queue Operations Example

Operations
isFull()
dequeue()
peek()
dequeue()
dequeue()
dequeue()
dequeue()
isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

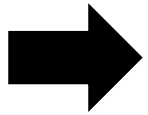
dequeue()

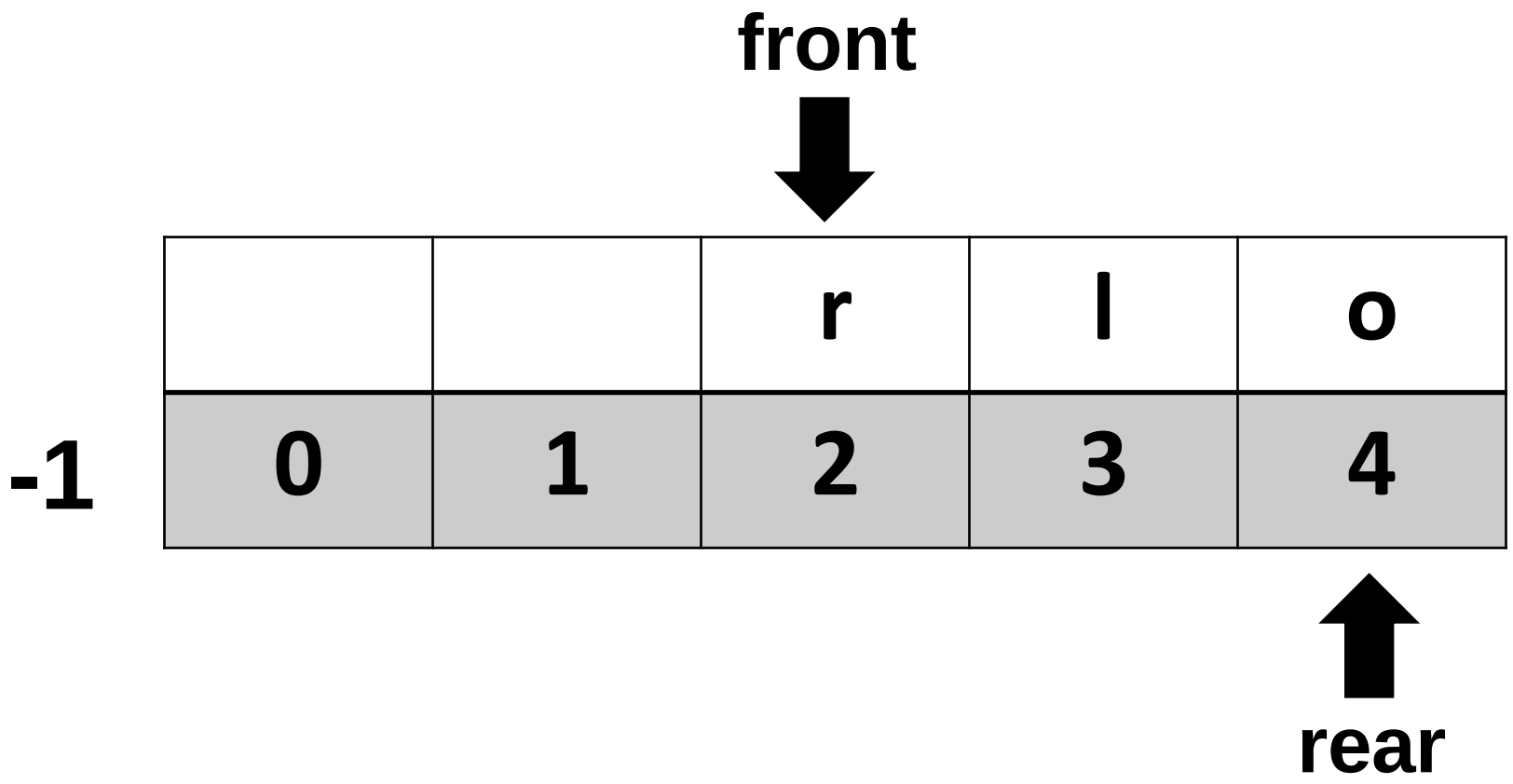
dequeue()

dequeue()

dequeue()

isEmpty()





Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

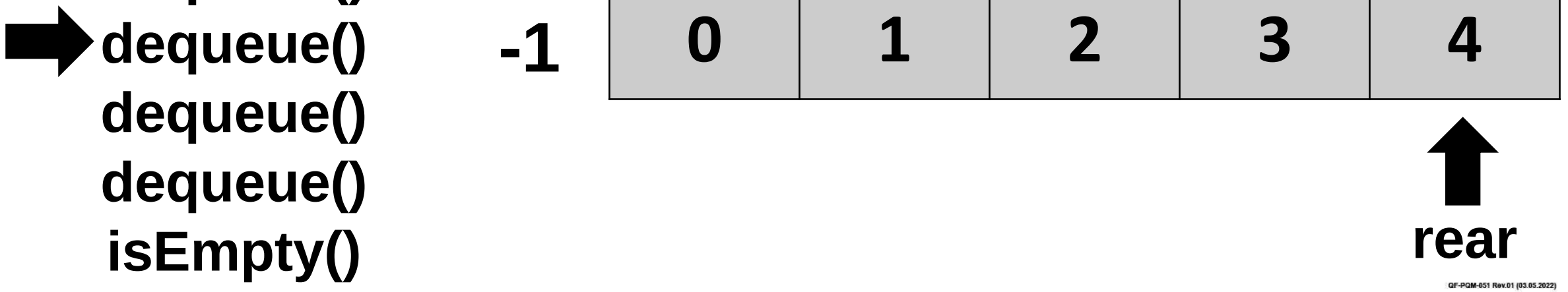
dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

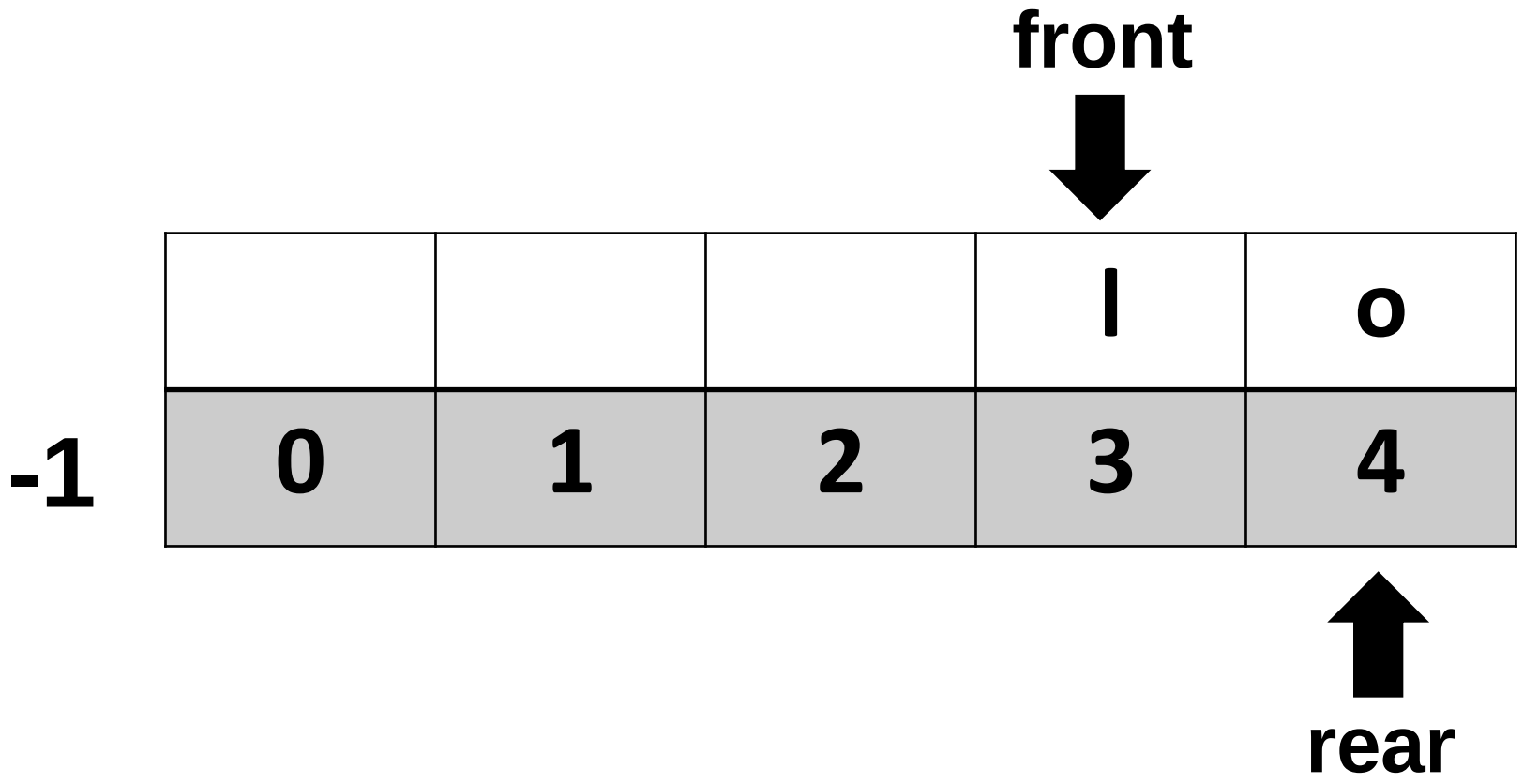
dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

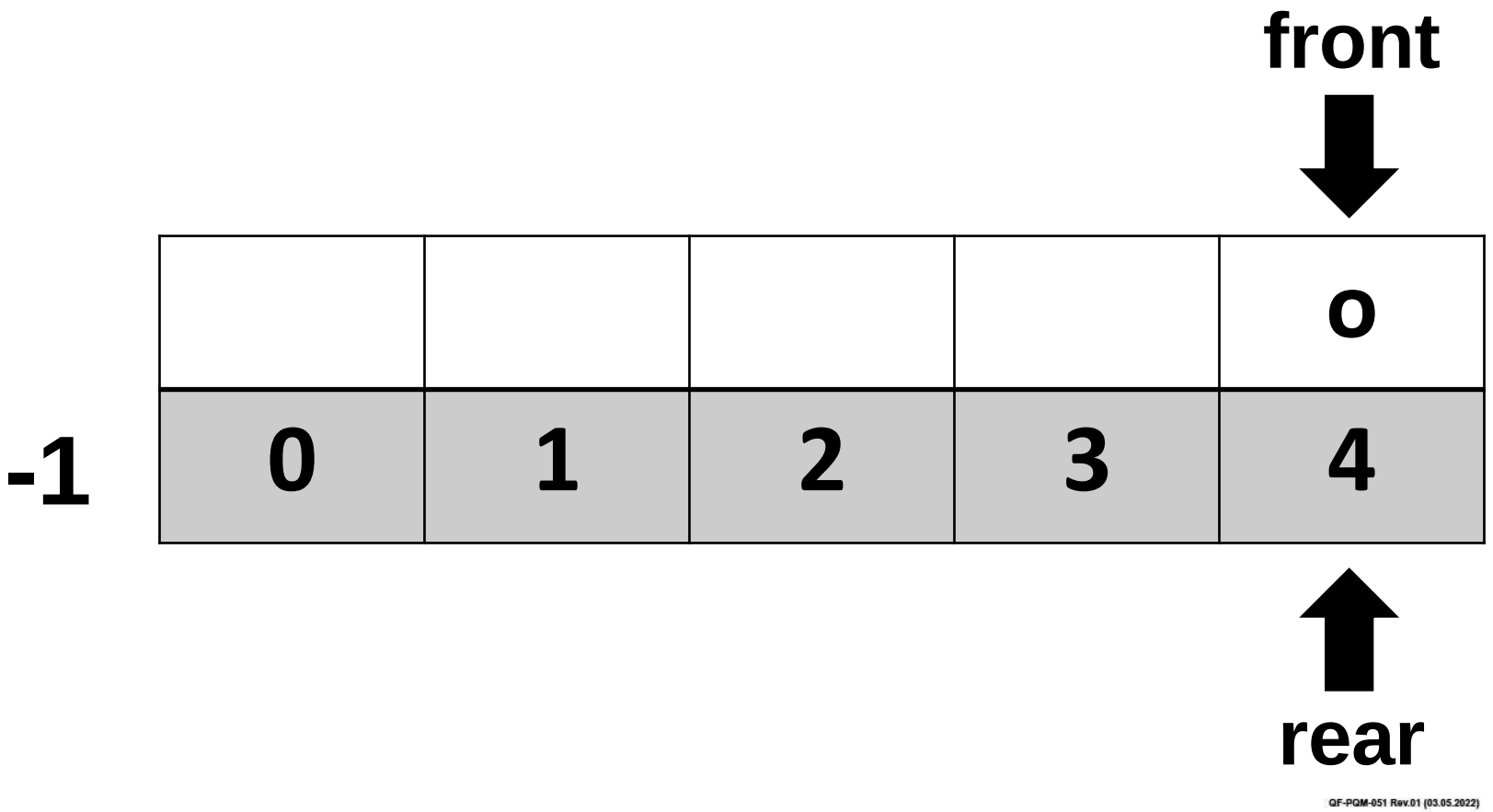
dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

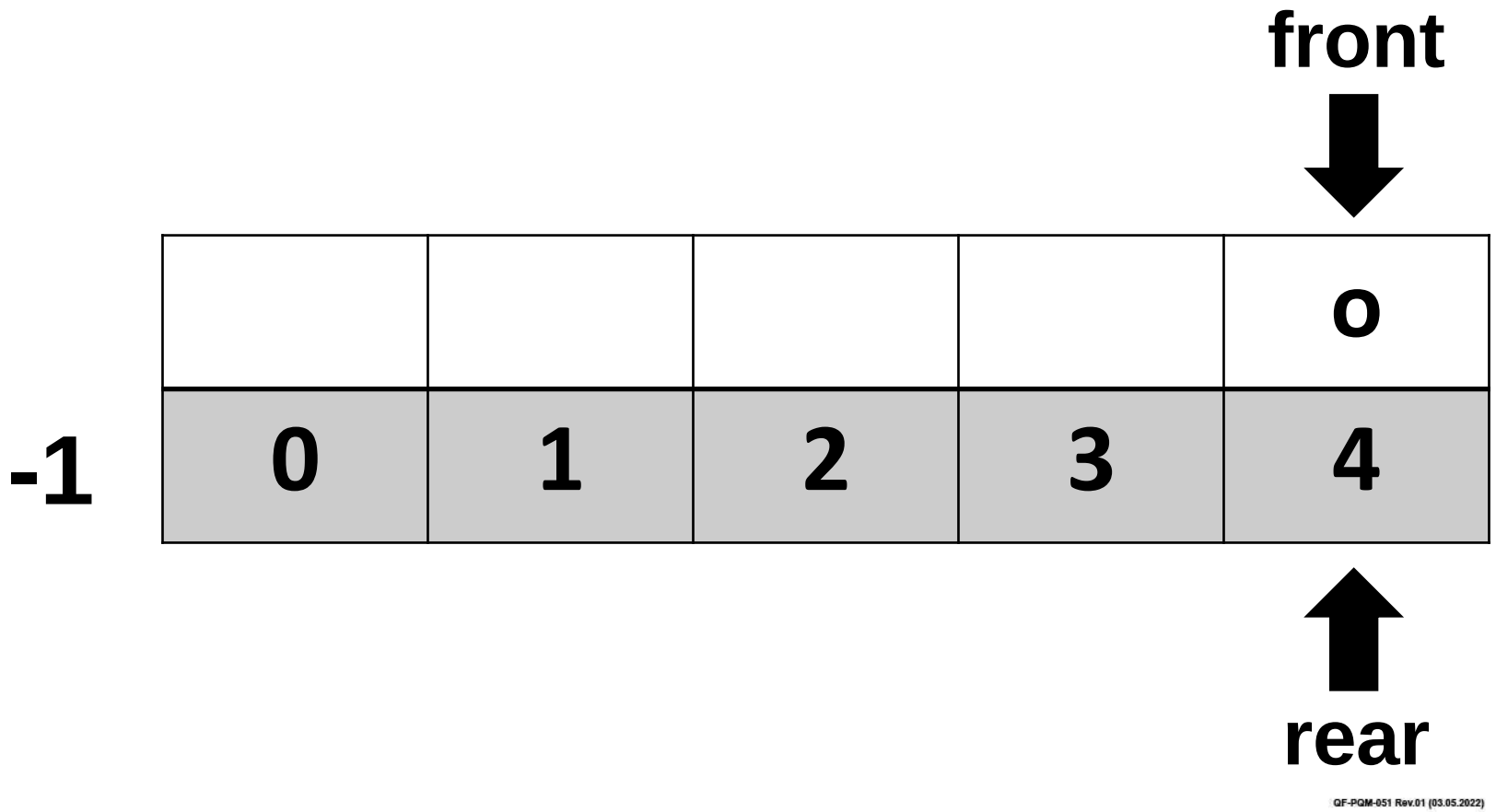
dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()



Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

dequeue()

isEmpty()

front

-1

rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

➡ isEmpty()

front

-1

rear

0	1	2	3	4

Queue Data Structure

Queue Operations Example

Operations

isFull()

dequeue()

peek()

dequeue()

dequeue()

dequeue()

dequeue()

➡ isEmpty()

front

-1

rear

0	1	2	3	4

True