Collections with Iteration Order: Lists

Richard Warburton

Java champion, Author and Programmer

@richardwarburto www.insightfullogic.com

Outline

Key Features

Shipment Example

Implementations

Key Features

Lists are collections with iteration order

```
void add(int index, E e);
E get(int index);
E remove(int index);
E set(int index, E element);
boolean addAll(int index, Collection c);
```

Each element has an index

An index is an int representing its position in the List.
We can modify Lists using indices

```
int indexOf(Object o);

int lastIndexOf(Object o);
```

You can also lookup indices by value

Sublists are views over ranges of lists.

Modifying the view modifies the List.

```
List subList(int fromIndex, int toIndex);
```

Sorting

```
list.sort(Comparator<? Super E> comparator)
```

◂ List Static Factory Methods

```
List<E> of()

List<E> of(E e1)

List<E> of(E e1, E e2)
```

◂ Creates Unmodifiable List instances

◂ Overloads for 0-10 arguments

```
List<E> of(E … elements)
```

◂ Varargs constructor for > 10 arguments

```
List<E> copyOf(Collection<E>)
```

◂ Creates an unmodifiable copy of an existing collection

```
List<E> of()

List<E> of(E e1)

List<E> of(E e1, E e2)


List<E> of(E … elements)


List<E> copyOf(Collection<E>)
```

- List Static Factory Methods
- Creates Unmodifiable List instances
- Overloads for 0-10 arguments
- Varargs constructor for > 10 arguments
- Creates an unmodifiable copy of an existing collection

Shipments Example

Light Products

Heavy Products

Shipments Example (2)

Shipments Example (3)

Implementations

Interfaces define behavior.

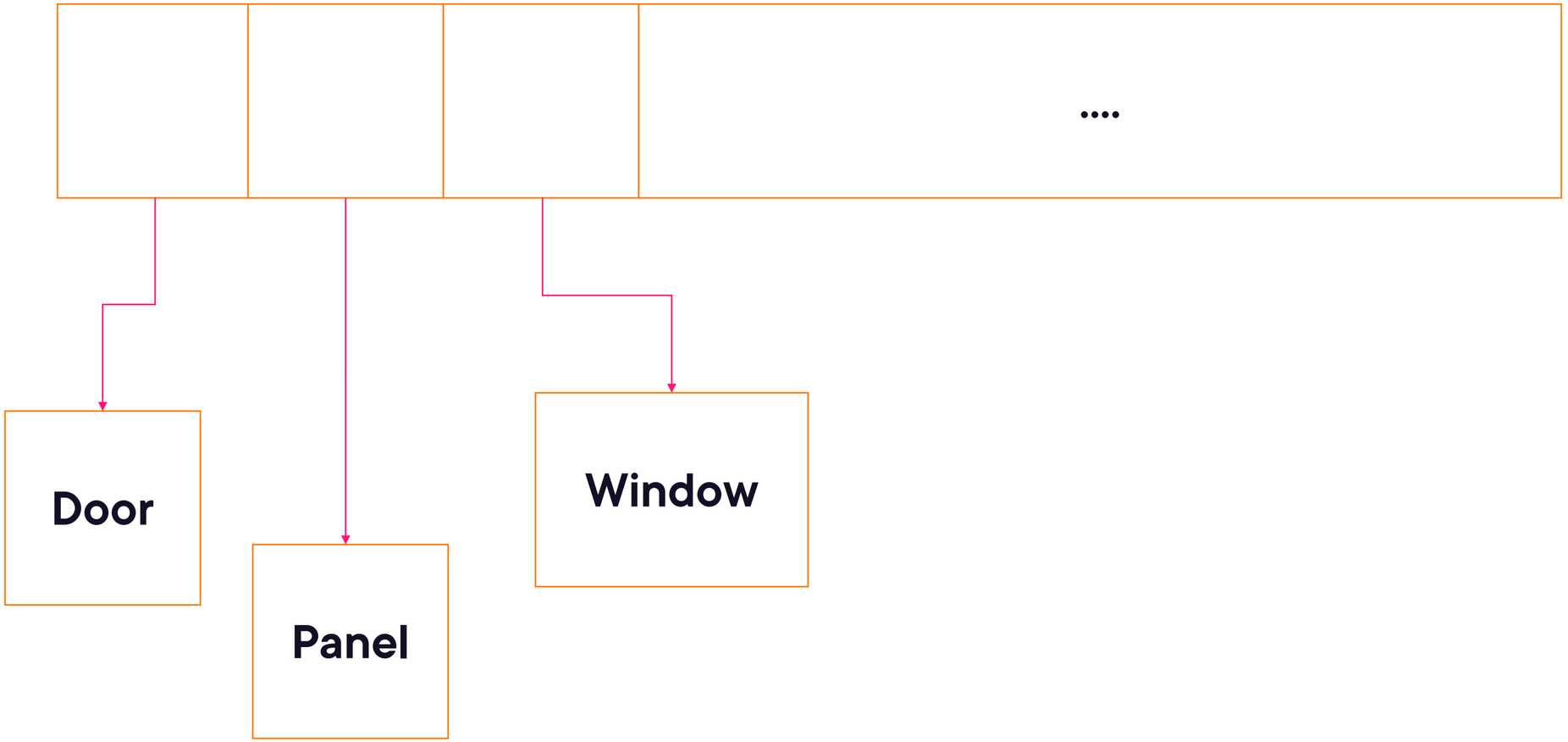
Implementations determine performance.

List Implementations

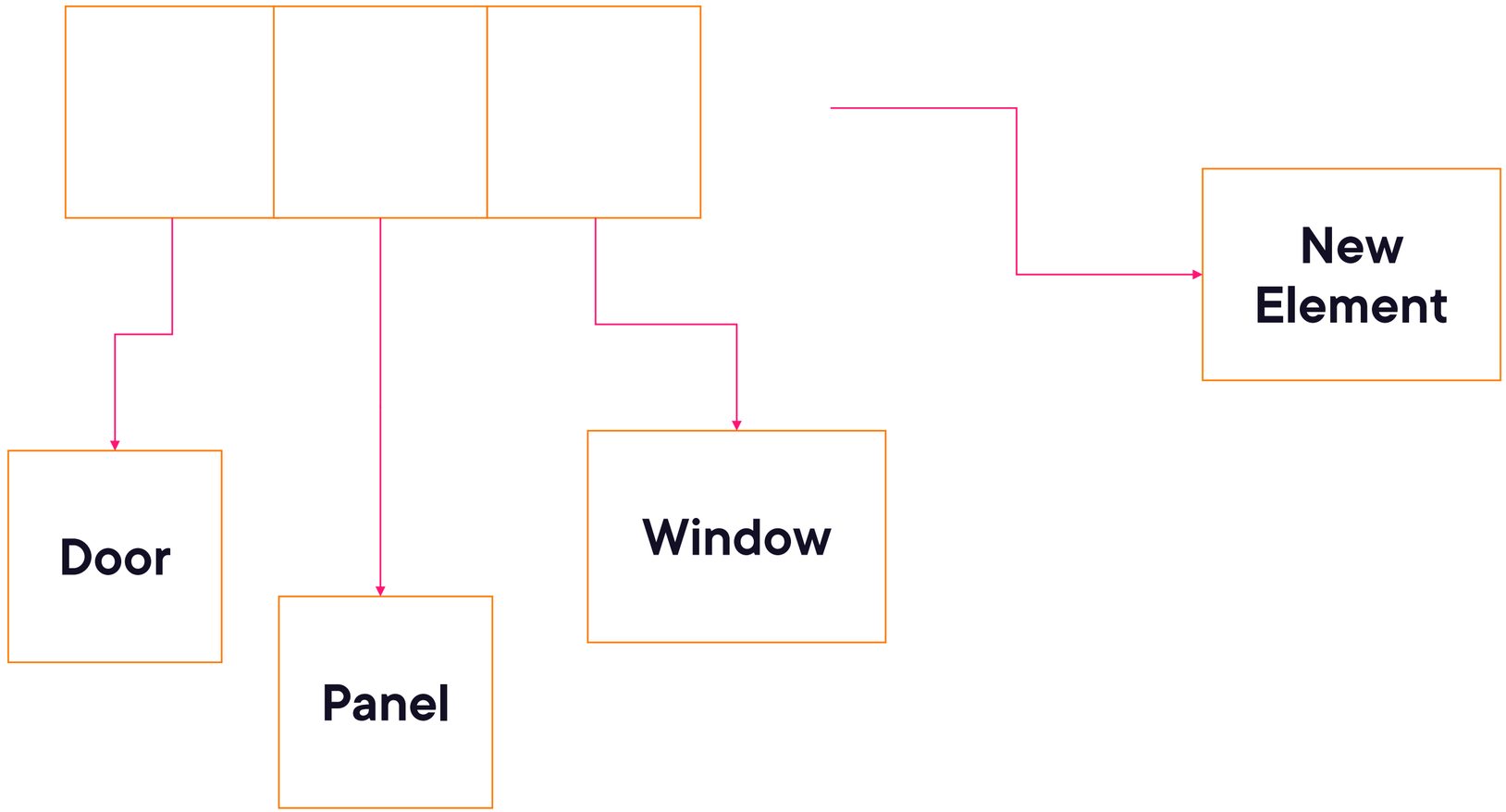
ArrayList

LinkedList

ArrayList



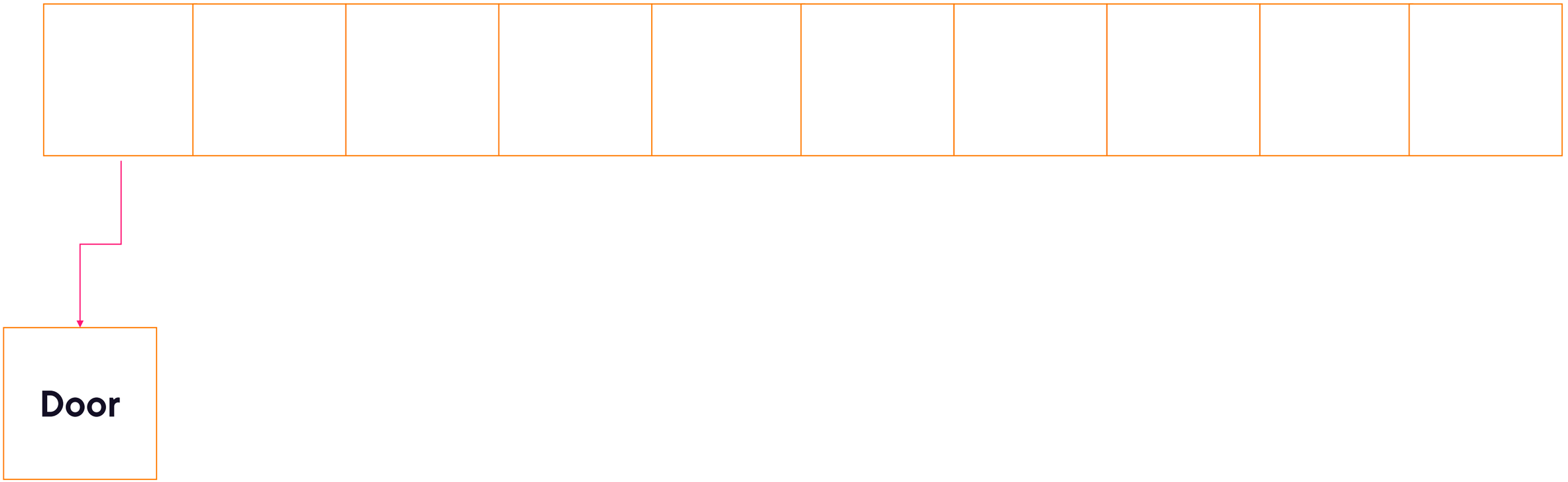
ArrayList



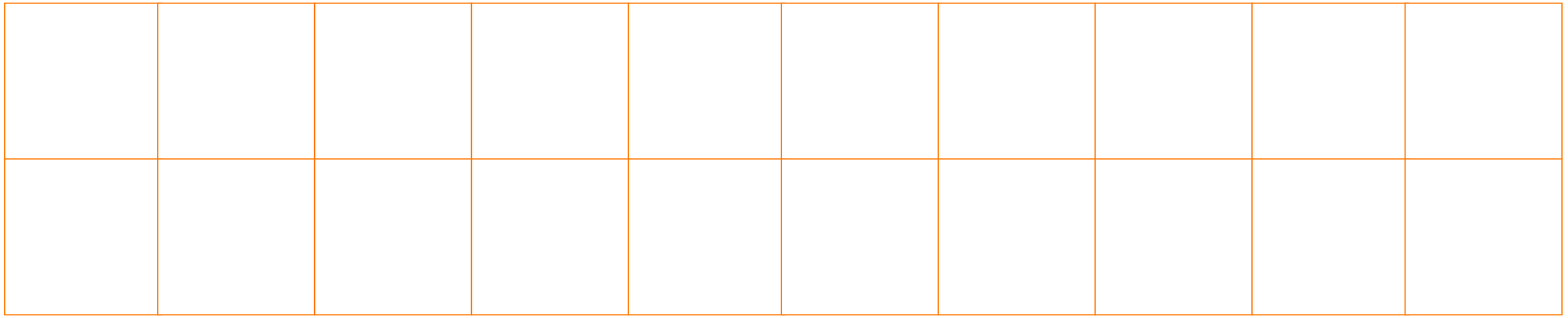
Empty ArrayList

```
null
```

Initialised ArrayList



Growing ArrayList

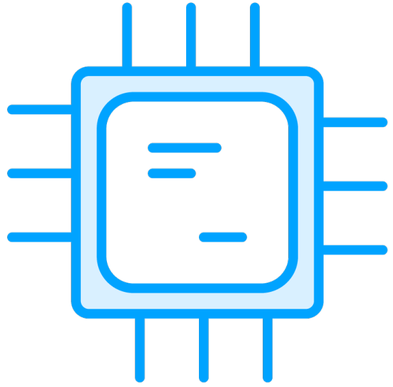


Doubling Strategy

ArrayList

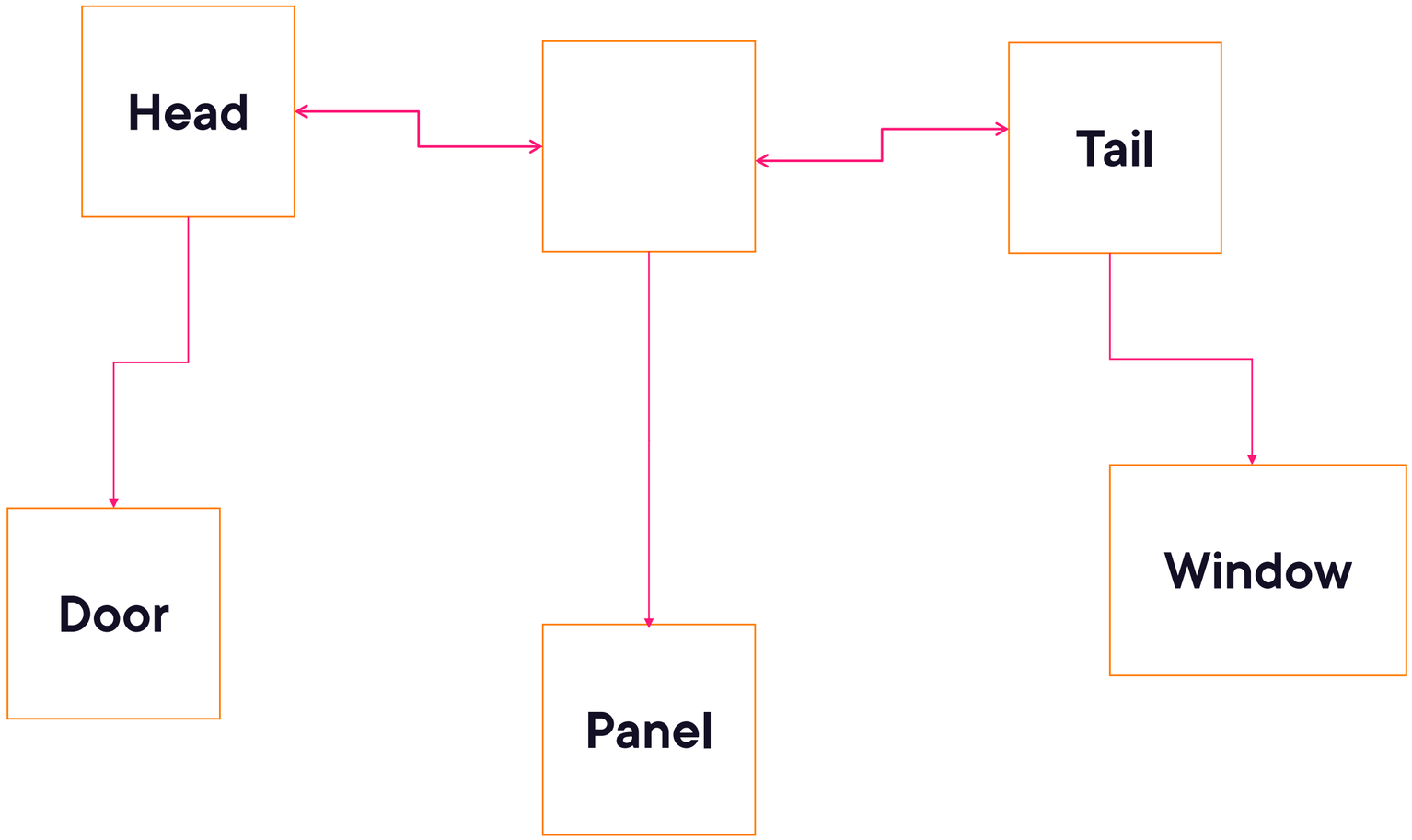
Good General Purpose Implementation

Use as Default

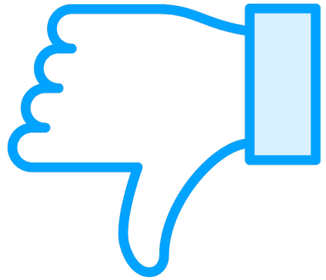


CPU Cache Sympathetic

LinkedList



LinkedList



Worse performance in most cases

Use when adding elements at start

Or when adding / remove a lot

Implementation Performance

Performance Comparison

	`get`	`add`	`contains`	`next`	`remove`
`ArrayList`	O(1)	O(N), Ω(1)	O(N)	O(1)	O(N)
`LinkedList`	O(N)	O(1)	O(N)	O(1)	O(N)

List has Legacy Implementations

Avoid these!

Vector

Stack

Conclusions

Summary

Demonstrated key List features

Looked at different performance tradeoffs

Lists are really commonly used

Up Next:

Up Next:
Storing Key / Value Pairs: Maps