

Data Structures for Games

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Data structures are a large and useful feature of programming, but how do we use them for games? For our Zorkish game, we next need to implement a working inventory system to store all of the player's items. Below we will briefly discuss some of the data structures that we could use, their pros and cons and why we chose the structure we did.

Criteria

For this report we will use the following criteria to help choose the best candidate for our inventory system.

- Allows storage of custom class objects
- Is dynamic in size
- Has quick access of its contents
- Allows easy addition/removal of objects
- Does not require unique keys

Array

Advantages for an inventory system:

Low overhead, quick access of contents $O(1)$, allows custom object storage

Disadvantages for an inventory system:

Static, length of array cannot be altered, in this context the addition and removal of objects may not be easy

Queue

Advantages for an inventory system:

Allows custom object storage

Disadvantages for an inventory system:

Follows the first in first out structure, can only push items to the back and pull items from the front

Vector

Advantages for an inventory system:

Dynamic size, allows storage of custom objects, allows random access $O(1)$, easy insertion and removal of objects,

Disadvantages for an inventory system:

Possible large overhead

Map

Advantages for an inventory system:

Allows custom objects, random access $O(1)$

Disadvantages for an inventory system:

Requires a unique key for each object, is slower to access than a vector/array, larger overhead than other structures

Results

	Array	Queue	Vector	Map
<i>Allows custom class objects</i>	yes	yes	yes	yes
<i>Dynamic size</i>	no	yes	yes	yes
<i>Quick (random) access</i>	yes	No	yes	yes
<i>Easy addition / removal of objects</i>	no	no	yes	yes
<i>Does not require unique key for storage</i>	yes	yes	yes	no

Because of the results above, we will be using the `vector` class to be the underlying data structure for our inventory system. This is because it meets all of our criteria and seems like the easiest and most effective structure to use. Especially since we do not need to worry about performance or optimisation at the moment