**Jurassic Park**

Java Exercise – Collections

The purpose of this exercise is to teach you about the different types of collections available from Java, and when to use each one.

We will do this using the analogy of building a dinosaur park. The pre-built class files provided give you access to the Park object, which you will extend by writing a subclass called JurassicPark, and the different dinosaurs that will be shipped into your park. These dinosaurs cannot be allowed to roam loose or the park would be chaos. It is up to you to create the right enclosures, using collections, that will safely house the random set of dinosaurs you are given.

By providing a random seed value to the Park constructor (called using the keyword super), you will be able to revise and attempt the same park scenario over and over until you complete it successfully.

Below are two tables explaining the different collection interfaces and implementations available to you, which you will use to create Enclosure objects for the dinosaurs, and the dinosaur types you may encounter and the attributes of each. Use the attributes of each dinosaur as clues to indicate which collection you should use to enclose the dinosaurs.

Note that you can put more than one type of dinosaur in each enclosure, and in most cases you will probably have to do this. You must use exactly the amount of enclosures specified by the Park.

Keep in mind that not all dinosaurs can get along in the same enclosure (this is indicated by which traits they have), and some dinosaurs may require a certain type of enclosure, or may refuse to be housed in certain types of enclosures.

We are not making use of the Map or HashMap collection types as they are more complex.

Have fun designing your park! Use the sample code provided to get started.

(It is entirely possible to encounter an unsolvable park; just change the seed value and try again.)

**Collection Types**

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface** | **Implementations** | **Pros** | **Cons** |
| Set | HashSet | Quick inserts and lookups; no duplicates allowed | Strictly unsorted, slow resizing |
| TreeSet | Maintains sorted order, quick resizing; no duplicates allowed | Slow deletes |
| List | ArrayList | Quick inserts and lookups | Slow deletes and resizing |
| LinkedList | Quick inserts and resizing | Slow deletes and lookups |
| Stack | Add/remove only from the top (LIFO) | Single entrance-exit |
| Queue | PriorityQueue | Add to top, remove bottom (FIFO) | One entrance, one exit |
| Deque | ArrayDeque | Add/remove to either top or bottom | Two dual-entrance/exits |

**Dinosaurs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Nature** | **Group** | **Diet** | **Size** | **Age** |
| Stegosaurus | SOLO | ARMORED | OMNIVORE | LARGE | JURASSIC |
| Velociraptor | PACK | FIERCE | CARNIVORE | SMALL | CRETACEOUS |
| Brontosaurus | DOCILE | TALL | HERBIVORE | ENORMOUS | JURASSIC |
| T-Rex | RAVENOUS | DANGEROUS | CARNIVORE | GARGANTUAN | JURASSIC |
| Ankylosaurus | FEARLESS | ARMORED | OMNIVORE | MEDIUM | CRETACEOUS |
| Brachiosaurus | AGGRESSIVE | TALL | HERBIVORE | ENORMOUS | JURASSIC |
| Pteranodon | DOCILE | FLYING | HERBIVORE | SMALL | TRIASSIC |
| Pterodactyl | PACK | FLYING | OMNIVORE | MEDIUM | CRETACEOUS |
| Diplodocus | RAVENOUS | TALL | HERBIVORE | LEVIATHAN | JURASSIC |
| Liaoxiornis | RESILIENT | ARMORED | OMNIVORE | TINY | CRETACEOUS |
| Archaeopteryx | AGGRESSIVE | FLYING | CARNIVORE | LEVIATHAN | JURASSIC |
| Coelophysis | RESILIENT | FIERCE | OMNIVORE | TINY | TRIASSIC |
| Iguanodon | FEARLESS | SMART | HERBIVORE | MEDIUM | CRETACEOUS |
| Eoraptor | IMPATIENT | SMART | CARNIVORE | TINY | TRIASSIC |
| Triceratops | DOCILE | SMART | OMNIVORE | LARGE | CRETACEOUS |
| Plateosaurus | IMPATIENT | FEEBLE | HERBIVORE | ENORMOUS | TRIASSIC |
| Herrerasaurus | SOLO | FEEBLE | CARNIVORE | TINY | TRIASSIC |
| Allosaurus | DOCILE | FEEBLE | OMNIVORE | LARGE | JURASSIC |

**Attributes**

|  |  |
| --- | --- |
| **Attribute** | **Requirement** |
| SOLO | Cannot be placed in the same enclosure with others of its own kind, or in an enclosure that allows duplicates |
| PACK | Must be placed in an enclosure that allows duplicates |
| DOCILE | Can be placed with any other dinosaur except ones that are fierce |
| RAVENOUS | Carnivores need to be in a structure that allows it to be quickly located (quick lookups); herbivores cannot be housed with other herbivores or omnivores as it will eat their plant food and starve them |
| FEARLESS, AGGRESSIVE | Attacks smaller or larger dinosaurs; must be placed in an unsorted structure to prevent it ending up near dinosaurs that it would attack |
| IMPATIENT, FLYING | Cannot be placed in structures with only one entrance or exit |
| RESILIENT | Has high stamina and endurance; needs to travel long distances in single file, so it requires a long exhibit with only two entrances/exits, one at each end |
| ARMORED | Can be placed in the same enclosure as fierce dinosaurs |
| FIERCE | Can only be placed with other fierce dinosaurs, or armored dinosaurs |
| TALL | Grows quickly; needs an environment that allows for quick resizing |
| SMART | Requires an enclosure that allows dinosaurs to be quickly inserted, otherwise it is smart enough to escape before being shut in |
| FEEBLE | Cannot be placed in the same enclosure with carnivorous or omnivorous dinosaurs which it is too weak to defend itself from |
| DANGEROUS | Only safe with others of its kind |