Storage Location Management

Purpose:
This document is a supplement to the Administration I Use Case document (caLIMSII_UseCase_Administration_I_milestone.doc) and the UML Class Diagram which was created to describe the Storage Management Use Case.

Description:
A storage location is an area, structure or device used to hold samples, reagents, supplies or other items.

The storage location Use Case is realized as two entities:

a) **StorageDevice:** A StorageDevice is a special type (subclass) of Equipment. A StorageDevice inherits all the attributes, associations and operations from the Equipment super class. A StorageDevice typically has electrical components and/or some environmental control. Examples include Freezer, Coldbox, Dessicator, Cold block, and Incubator**.** The physical location of a StorageDevice is defined by a Location entity.

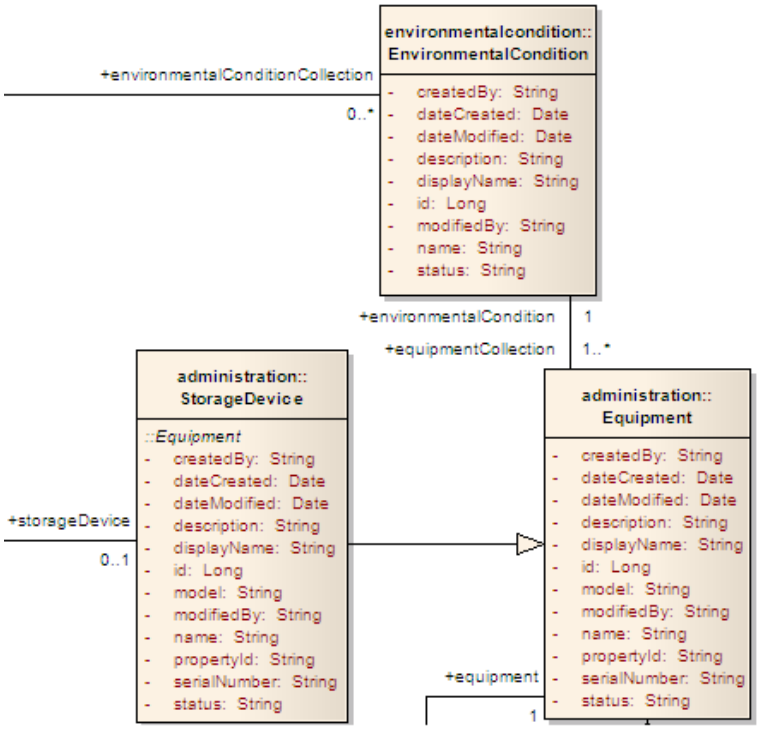

Fig 1: Equipment, Storage Device, and Environmental Condition

b) **StorageSpace:** A StorageSpace is a physical area or fixed structure such as a Cold Room, Cabinet, Compartment or Shelf. A StorageSpace may be subdivided into one or more areas defined by an internalLocationCollection (see Fig 2) and a Layout. The physical location of a StorageSpace is defined by a Location entity (scenario 2). Note that every StorageDevice contains at least one StorageSpace (*e.g.* a Freezer [StorageDevice] contains one or more Compartments [StorageSpace]).

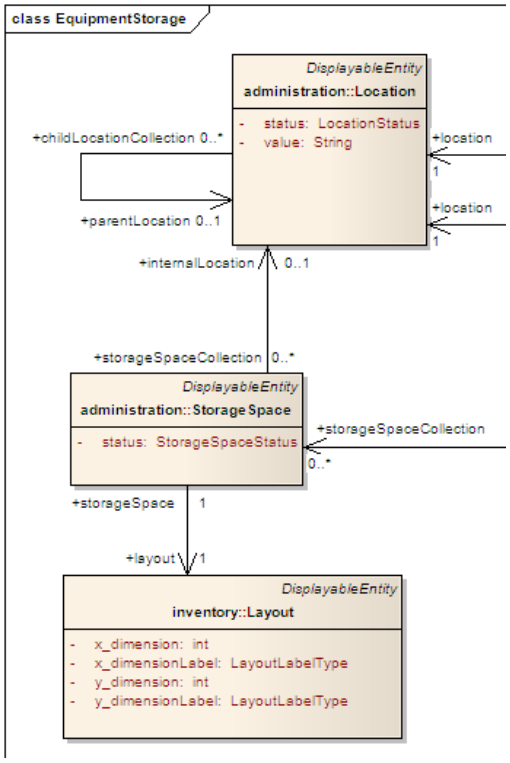

Fig 2: StorageSpace, Layout and Location

Location: A Location is an entity that defines where an item can be found. Location has a recursive relationship to itself.

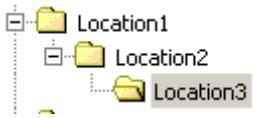

Fig 3: Recursive relationship of Location to itself.

Location1, Location2 and Location3 are Location instances associated in a hierarchical fashion. For example, they could represent a building, floor, and room.

Scenario 1. There is a book located on the right side of the second shelf of a bookcase. The Shelf is a Location within the Bookcase StorageSpace. A Shelf may be subdivided into left, middle and right Sections. Each Section is also an instance of a Location. In this scenario one Shelf has a parent relationship to three Sections – one Location instance is associated to multiple Location instances.

Scenario 2. Building 10, 2nd Floor and Room A210 are all Locations. Building 10 has a parent relationship to 2nd Floor, and 2nd Floor has a parent relationship to Room A210.

Association between StorageDevice, StorageSpace and Location:

Each StorageDevice is associated with a Location (through Equipment). For example, a freezer is in a room on the floor of a building.
Each StorageDevice has at least one StorageSpace. A freezer, for instance, has at least one compartment or shelf.
Each StorageSpace, in turn, has one or more internal Location(s). A freezer compartment, for example, contains one or more shelves.
The hierarchy of associations is: Location(s) -> StorageDevice (optional) -> StorageSpace -> (internal) Locations(s).

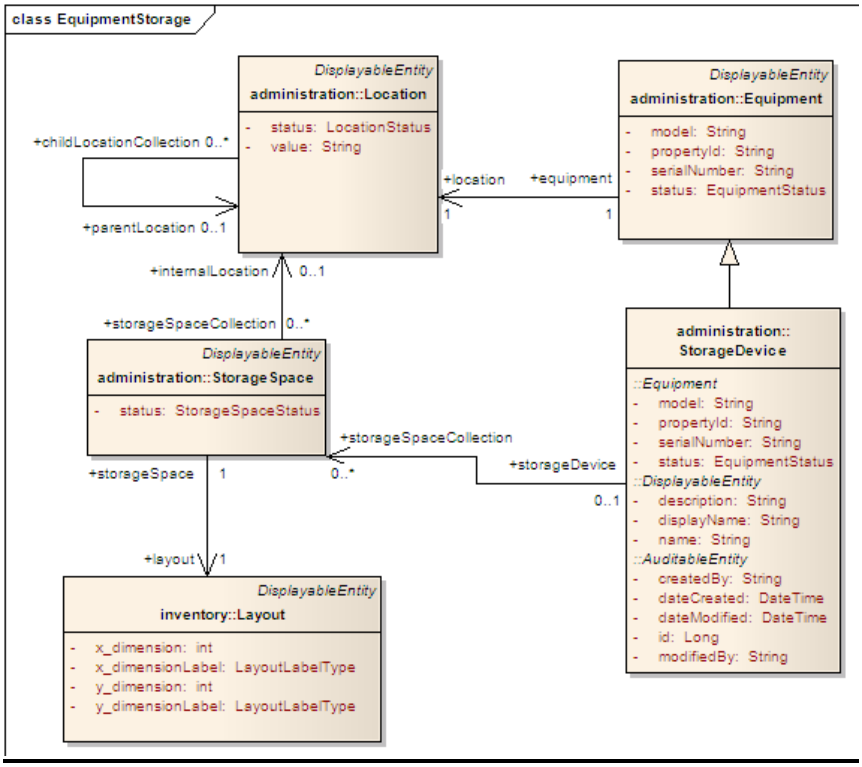

Fig 4: StorageDevice, StorageSpace and Location.

Example: multi-tiered location of specimen

Identify the StorageDevice, StorageSpace and Locations in the following set of associated entities: Sample, Tube, Box, Rack, Shelf_Section, Shelf, Compartment, Freezer, Bay, Room, Suite, Floor, Building, and Address.

Item	Entity Name
Specimen	Specimen
Tube	Container (simple)
Box	Container (complex: row/column)
Rack	Container (complex: dimension1/dimension2)
Shelf_Section	Location (child of Shelf)
Shelf	Location (internalLocationCollection of Compartment)
Compartment	StorageSpace
Freezer	StorageDevice
Bay	Location (child of room)
Room	Location (child of suite)
Suite	Location (child of floor)
Floor	Location (child of building)
Building	Location (parent)
Address	PostalAddress (ContactInfo associated with Building)