Lesson 2

Applying conceptual modelling 2
(Museum inspiration case)

Goal
To practice relational database design with emphasis on a UML schema inspired by a museum case. To understand and apply design patterns in UML to a case at hand taken from the museum domain. To understand advantages and disadvantages with different solutions.

Task

Lesson 2 consists of a modelling session where a UML class schema shall be designed with respect to a number of user requirements given via a free text domain description.

Domain description Museum:

The central part of the museum is the artefacts that are displayed; a lot of the information that the users want to store and retrieve from the database evolves around the various types of displayed artefacts. All artefacts share some common properties, e.g. every artefact has an identifier, as well as a description that classifies the artifact plus information about when the artifact was created. The users also want to be able to annotate each artefact with a set of keywords that describes the characteristics of the artifact in a shorter way compared to the longer description.

Artefacts can, however, also have distinguishing features – which is why the artifacts have been classified into four different categories: Design artefacts, Scientific artefacts, Historical artefacts and Collections, all of which have their own properties.

An artefact is classified into one category or artefact type, while and artefact type may be related to many artefacts. The type or category describes the general properties that classify all of the individual artefacts that belong to a certain category. Both artefacts and artefact types can have their own properties. For instance an historical artefact's description may contain information about the state of a certain bone fragment of an ancient individual of the species `Australopithecus,` while the corresponding historical artefact type description contain information about average length of Australopithecus.

A collection artefact is an artefact that combines several other artefacts into a thematic unit. Usually collections contain artefacts of the same type, for instance 'Historical artefacts from the Viking era' but a collection can also combine artifacts of different categories and time periods. Collections are usually permanent or semi-permanent in museums and an artefact may belong to at most one collection and need not be part of any collection at all. Each artefact is, furthermore, related to at most one collection and an artefact need not be part of any collection.

A design artifact has one or several artists as its creator. Design artifact is a heterogeneous concept and can be divided into several categories some of which have different properties. The main design artifacts are Paintings, Sculptures, Films, Photos, Digital artefacts and Installations.

A distinguishing feature of a painting in a museum is that it may have been scanned using spectral analysis, effectively rendering different states of the painting as high resolution images. Information about these images must be present in the database. For a sculpture it is important

to keep information about what material the sculpture is created from. An example of a digital artefact is a computer program, for instance a computer game. Photos and films are design artefacts that the museum, for the moment, keep no other information on than who is the creator/artist. An installation, finally is a design artefact that combines other artefacts into a design of its own. In contrast to collections installations are not permanent or semi-permanent but designed for a certain period in time.

Scientific artefacts are artefacts from different scientific disciplines such as natural science, biology, geology etc. while historical artefacts comprises artefacts from various historical eras such as from the stone age until today.

Each artefact has a placement within the museum. This position is determined by an x- and y-coordinate with respect to a room. Some artefacts are placed in shelves. A shelf is situated in exactly one room and a room belongs to a department. A department always belongs to an organization. A museum is one example of an organization.

The persons in the organization are not as central as the artefacts for the purpose of designing this database – the only information to be modelled about a person is name, address, phone and whether or not a person is employed at a museum. As owners or creators of the artefacts displayed the persons are important, each artefact has an owner and this owner is either a person or another museum or other type of organization.

An artifact, as said above, belongs to a person or organization. The latter two can also buy artifacts from each other and sometimes it is important to keep track of who bought what from whom. And when it happened, i.e. the purchase date.

Tip: Use the analysis patterns described in the conceptual modelling lectures (inheritance, reification, power types) as inspiration to the solution.

One suggested solution:

Conceptual model of the museum case in the form of an UML classchema: