Assignment 3

1. Reflection:

In my assignment 2 report I did not have enough of a reflection on my assignment 1 feedback from the marker. I showed that I needed to have more entities, data manipulations, queries, and business rules on penalties for students, expiration, issued item limits and borrowing reservations. In my assignment 2 I fixed these problems. In assignment 2 EER Diagram and data dictionary entity types I needed staff and student member data and moveable and immoveable data. I got the relationship types correct. I did not need specific attributes for entities in the attributes table for student or staff. In the normalized relational schema in DBDL I needed to give at least two examples of normalization up to BCNF. I also needed to mention the functional dependencies of each table and in which normal form the table is -6. For the tables that have only one functional dependency I needed to explain and consider only that candidate key.

2. Requirement Specification:

2. Data Requirements

2.1. Members Data

Each member of the university has their own set of data which is recorded and put into the database. The members data is specific to their purpose in using the universities resources.

2.1.1. Student Data

The data stored on each student includes: the student number, full name, address, postcode, sex, date of birth, student category, student area of study, resource id being borrowed, time and date the item is being borrowed and what the item is being used for.

The student information stored relates to the management of resources and the student obtaining the resources to achieve a satisfactory system where resources cannot be lost or stolen.

Students have an advisor to their area of study which can aid in gaining access to more resources to enhance learning capabilities.

2.1.2 Staffs Data

Staffs data is also recorded and is used in the database. The data being recorded form staff includes their full name, staff number, address postcode, sex, date of birth, job title, area of teaching, resource id being used, time and date the resource is being used and what its being used for. The point of storing this data is to keep track of the super visor of the resource and to maintain a safe and able environment to properly use the resources.

2.2. Category

Each resource is categorised and place in a category that matches the resource identification. Each category unique identifier code is used to track how long a resource is on loan for and this also uses other data for example, name, description, and maximum time until the resource has to be returned or stopped use.

2.3. Resources

Every resource has a unique identification so it can be stored as data in a database. In the database the resource also has a description and a status tag whether or not it is available, being borrowed, in use, lost, damaged or under maintenance.

2.3.1. Physical

2.3.1.1. Moveable

Physical resources which are moveable include speakers, phones, cameras, microphones, computers, monitors, desks, books, and more that are easily moveable and able to be loaned to students or staff.

2.3.1.2. Immoveable

Physical and immoveable resources include laboratory rooms, classrooms, studios, heavy science equipment and other immoveable resources that are used by the university which can be used by students and staff. These resources can be loaned to members to use the room the resource is in and close the room to others for the time in which the member acquired it.

2.3.2. Digital

Digital Resources being put in this database include software and servers that host

2.4. Location

The location of use of resources has to be recorded so items are not lost, stolen or damaged without an idea of how it happened. The location data stored includes address of borrower, where the resource will be used, and other locations it might go to.

2.5. Acquisition Request

The acquisition request will include the member borrowing the resource to fill out a form or document applying for use of the resource which will need the member to include the member data, category data, resource data and location data to gain access to the resource.

2.6. Course Offering

The data that will be stored on the course offering include the members experience in that area of study, marks for those previous courses, age, area to study, unique course identifier, future area of study and availability of that course.

2.7. Reservation

The data stored for the reservation of resources and equipment includes member data, category data, resource data and location data which is used to reserve resources for a future date. Members can reserve resources in which their privilege allows them access. Reserving access to resources will require the member to pick up or use the resource on that date and time.

2.8. Privilege

The data that privilege stores is name, description, category of privilege to that member and a maximum amount of resources that can be loaned at any given time and date from that given category.

2.9. Loan

The data that loan stores is privilege, name description, member type and resource identification. A resource is loaned to a member with privilege and reason to use that specific resource.

3. Transaction Requirements

Transactions are the change to data or processes that result in change of data.

3.1. Data Manipulation

Data manipulation include the change of data to the existing data in a database. Data can be manipulated by inserting new data, updating existing data or deleting existing data. The

process of data manipulation would be monitored or set up so that important information is not lost or corrupt by the end level user.

Data entry can include:

Entering details of a new member requesting access to resources for learning purposes.

Entering details of new members that can request access to resources for ease of future access.

Entering details of time resources have will be acquired and used.

Entering details of new equipment being added to the resource list.

Entering details of a reservation to a member for a time acquiring a resource.

Entering details of a member's course offering.

Entering a location for a resource being acquired.

Entering privilege level of a new member.

Data update and deletion can include:

Updating or deleting the details of members.

Updating or deleting the details of members who were loaned resources.

Updating or deleting the details of resources.

Updating or deleting the course offerings for members.

Updating or deleting the location of a resource.

Updating or deleting the privilege of a member.

3.2. Query Transactions

Query transactions include searches that can be done to find or retrieve resources based on the data that has been put into the database.

Examples of queries that could come from this database:

a) List of details of members through unique identifiers, names, or resources on loan.

b) Identify the member responsible for damaging resources.

c) Identify the member currently accessing a resource.

d) Identify the member who has not returned equipment.

e) Identify the total number of members eligible to access resources of higher privilege.

f) List of names of members currently that have been suspended from using equipment.

g) List of unique identifiers of members in a certain area of study using a resource.

h) Find the location of member that has a resource.

i) List name, unique identifier, and area of study of member using resource.

j) Identify staff super vising use of resource in a location.

k) List details of a loan of a member.

l) Identify type of resource and privilege needed.

m) List reservations of all resources and members reserving the resources.

n) List available courses being offered to members.

4. Business Requirements

4.1. Catalogue Service

The catalogue service is used to search the database for resources. The purpose is to be able to search through the catalogue with key words, unique identifiers or names that identify a resource or member easily. This needs to be accessible to staff involved with upkeeping the database. There is a penalty for late returns by student members. Each student member has 12 points by default and loses 3 points for overdue resources. This is catalogued and accounted for when that student requests access of resources.

4.2. Loan Service

The loan service must provide facilities to issue and return resources to members and members to resources of access to those members. Loans have an expiration date on borrowing and reservations. Penalties apply to students that borrow resources and do not return them in time. The resources which are immoveable can be given access to use by

members but not loaned out and moveable resource can be loaned out to members with access. There is a maximum amount of resources which can be loaned to any one member. This includes an issued item limit for resources. Resources need to be in stock for higher priority members which involves the availability of certain resources at all times.

4.3. Acquisitions

The university will be updating and removing resources all the time. This may involve the staff to be able to acquire the resources earlier than the expiration date of member's access. Acquisitions may have priority members which will have access before another member. A member's access can be terminated if they do not return an item before the time due and this will revoke access to that member.

4.4. Reservation Service

Members should be able to reserve access to resources for future requirements if available ensuring access to those resources at the given time and date. Reserving access to resources requires the member to fill out the required data and can request extra time for that resource if the resource has not been requested access by another member. Members can cancel reservations before pickup or access can be cancelled if the resource is not picked up or accessed at the required time and date. Not cancelling access of resources in which can not be picked up or access by that time will result in a loss of 1 point. Admin reserves the right to cancel access at any time.

3. EER Diagram and Data Dictionary:

ENTITY TYPES:

Entity Name	Description	Aliases	Occurrence
Collection	Physical collection where resources are located		Physical location
Staff/Student	Physical person who is a member of the university	Member	Person joins University
Category	Resources are categorised and given resource ID		A resource is added
Resources	Physical equipment used at the university	Moveable/Immoveable	Physically located in collection
Location	Location of resources		Acquiring resource
Acquisition Request	Filing document with member data to borrow resource		Resource attempting to be borrowed
Course Offering	Courses to be offered to members		New members
Reservation	Filing to reserve resources		Filing
Privilege	Level of access of members		Borrowing resources

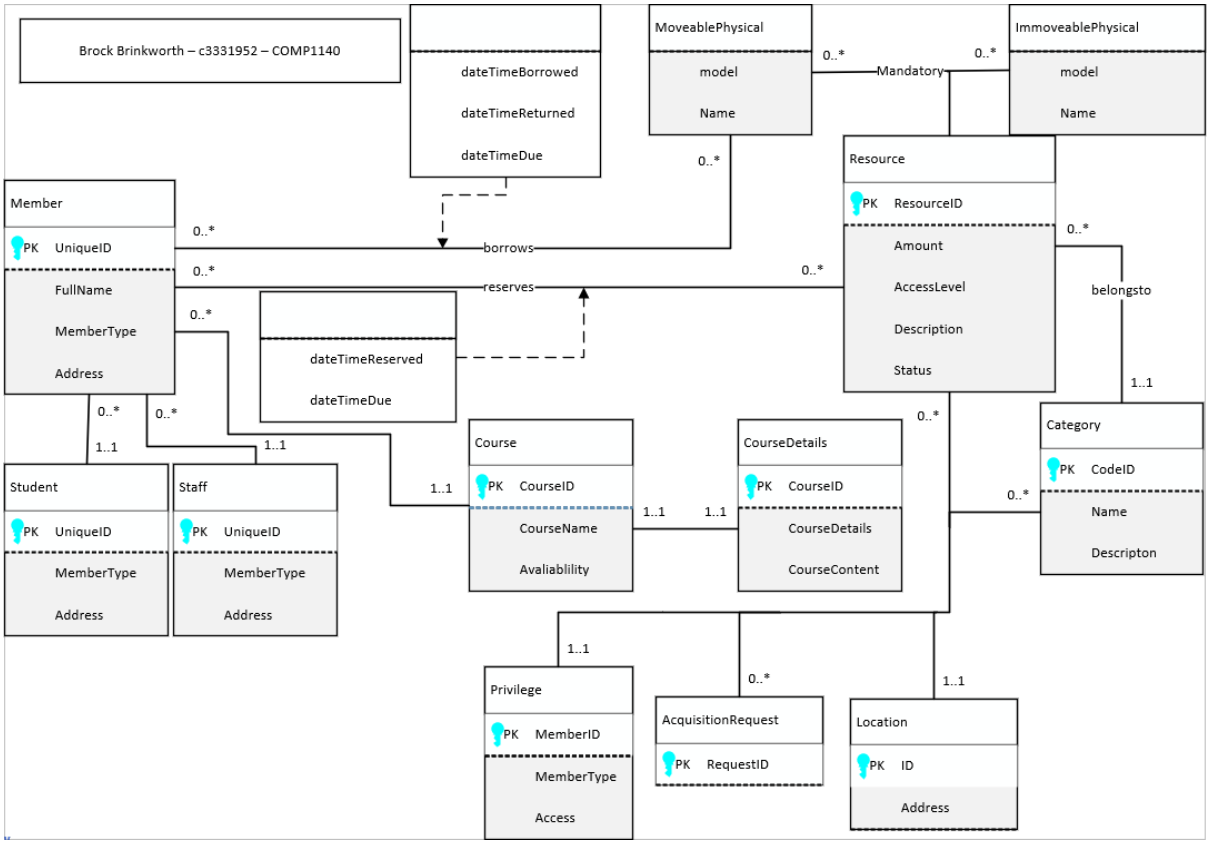
RELATIONSHIP TYPES:

Entity Name	Multiplicity	Relationship	Multiplicity	Entity Name
PhysicalCopy	0..*	LocatedIn	1..1	Collection
Member	0..*	mandatory	1..1	Privilege
Member	0..*	borrows	0..*	Resource
Resource	0..*	Belongs to	1..1	Category
ResourceType	1..1	Mandatory	0..*	Resource
MemberType	1..1	Belongs to	0..*	Member
Resource	0..*	LocatedIn	1..1	Location
Member	0..*	borrows	0..*	ResourceType

ATTRIBUTES:

Entity Name	Attributes	Description	Data Type	Null	Multivalued	Derived	Default
Student	unique	Unique ID	Char(5)	N	N	N	
	Name	Name of student	Varchar(50)	N	N	N	
	phoneNo	Contact phone number	Char(12)	Y	Y	N	
Staff	uniqueID	Unique ID	Char(5)	N	N	N	

	Name	Name of staff	Varchar(50)	N	N	N	
	phoneNo	Contact phone number	Char(12)	Y	Y	N	
Resource	resourceID	Unique ID	Char(5)	N	N	N	
	Name	Name of resource	Varchar(50)	N	N	N	
	Location	Location of resource	Varchar(50)	N	N	N	
	Privilege required	Level of access needed to borrow	Varchar(50)	N	N	N	
	Moveable resource	Resource able to be moved easily	Varchar(50)	N	N	N	
	Immoveable resource	Resource not able to be moved easily	Varchar(50)	N	N	N	
	Digital resource	Software resource	Varchar(50)	N	N	N	
	Acquisition Request	Form	Varchar(50)	N	N	N	
	Reservation	Form	Varchar(50)	N	N	N	
Privilege	Access Level	Members access level	Varchar(50)	N	N	N	
Category	resourceID	UniqueID	Char(5)	N	N	N	
Course Offering	MemberID	Courses being offered	Varchar(50)	N	N	N	



4. The relational model mapped from EER:

Resource(ResourceID, borrowID, amount, accessLevel, description, status)

Primary Key ResourceID

Member(UniqueID, borrowID, fullName, memberType, address, dateTimeBorrowed, dateTimeReturned, dateTimeDue, dateTimeReserved)

Primary Key UniqueID

Category(CodeID, name, description)

Primary Key CodeID

Foreign Key description

Staff/Student(UniqueID, FullName, MemberType, Address**)**

Primary Key UniqueID

Loan(borrowID, resourceID, accessLevel, amount**)**

Primary Key borrowID

FK resourceID

CourseOffering(courseID, UniqueID, avaliability**)**

Primary Key courseID

StudentEnrollCourseOffering(UniqueID, avaliablility**)**

Primary Key UniqueID

CourseOfferingToPrivilage(memberType, avaliability**)**

Primary Key memberType

MoveablePhyscial(model, name)

ImmoveablePhysical(model, name)

Location(ID, address)

Primary Key ID

Foreign Key address

Privilege(MemberID, memberType, accessLevel)

Primary Key MemberID

AcquisitionRequest(RequestID, borrowID)

Primary Key RequestID

FK borrowID

5. Normalized Relational Schema in DBDL:

Resource(ResourceID, borrowID, amount, accessLevel, description, status)

Primary Key ResourceID

Member(UniqueID, borrowID, fullName, memberType, address, dateTimeBorrowed, dateTimeReturned, dateTimeDue, dateTimeReserved)

R1(UniqueID, borrowID, memberType, address, dateTimeBorrowed, dateTimeReturned, dateTimeDue, dateTimeReserved**)**

R2(fullName**)**

Primary Key UniqueID

Category(CodeID, name, description)

R1(CodeID, description**)**

R2(name**)**

Primary Key CodeID

Foreign Key description

MoveablePhyscial(model, name)

R1(model**)**

R2(name**)**

ImmoveablePhysical(model, name)

R1(model**)**

R2(name**)**

Loan(borrowID, resourceID, accessLevel, amount**)**

Primary Key borrowID

Staff/Student(UniqueID, FullName, MemberType, Address**)**

Primary Key UniqueID

CourseOffering(courseID, UniqueID, avaliability**)**

Primary Key courseID

StudentEnrollCourseOffering(UniqueID, avaliablility**)**

Primary Key UniqueID

CourseOfferingtoPrivilage(memberType, avaliability**)**

Primary Key memberType

Location(ID, address)

Primary Key ID

Foreign Key address

Privilege(MemberID, memberType, accessLevel)

Primary Key MemberID

AcquisitionRequest(RequestID, borrowID)

Primary Key RequestID