**Database Design Document**

**version 1.1**

**prepared by: Team 8**

# Outline

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**Introduction**

**Scope:**

The scope of this report is to provide a high level architectural overview for a New Museum Database Management System (NMDBS) which is able to combine the information contained in the database of five separate museums (Figure 1.1). This report uses a high level database design to give a general overview on the handling and accessing information of all the museums.

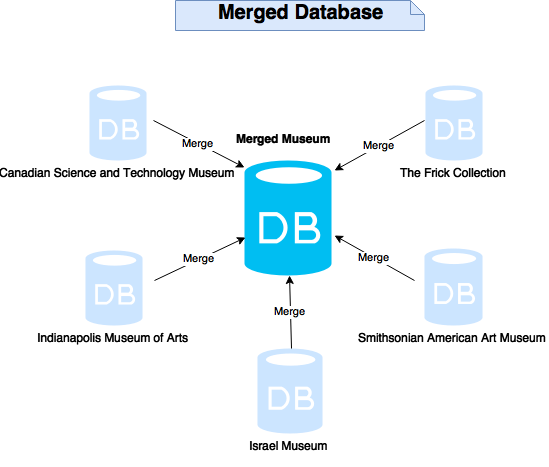
**Purpose:**

The purpose of the NMDBS project is to provide a robust and efficient museum database management system that can accurately record and later access data for each museum without losing any important information.

**Brief overview of the merged museum:**

The project consists of five different museums. Each museum specializes in one or more fields of art, science, and technology. All the museums are to be combined into the NMDBS. A short description of the what each museum specializes in is listed below.

1. The Frick Collection: specializes in different categories of art like painting, textile, sculpture, photographs, carvings, and clocks, ceramics, and metal works.
2. Indianapolis museum of Arts: Specializes in art from different time frames and regions including African, American, Asian, Mediterranean, and Contemporary art.
3. Smithsonian American Art museum: specializes in different categories of American artworks, from the colonial period to the present.
4. Israel Museum: specializes in different categories of chemistry, Physics, and African artwork with almost all its collections being paintings and sculptures.
5. Canadian science and technology museum: specializes in different science and technology inventions and creations related to past, current, and astronomy.



(Figure 1.1 New database system for merging five different museums. All relevant information from each of the partner museum database will be combined and adapted into an optimal new database)

**Database basic functionalities**

The database design was chosen so as to retain all relevant information relevant to works from all 5 partner museums, while keeping the most relevant information easily accessible and reducing the amount of confusing and disorganized features relating less relevant pieces of information. Listed below are the functionalities of the combined museum database.

**Functionalities relating to pieces of work for any of the museums**

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| --- | --- |
| Functionalities | Functionality description |
| Recording and accessing all basic information for each piece of work | The new database design records basic categorical information, the name, the author or source, the year of creation, the date of acquisition, a description and an entry location for which data was originally entered relating to each piece of work owned by one of the museums. Some of the museums had physical properties of the pieces of work recorded, including it being a painting, sculpture, carving etc. as well as a further classification of each piece. (For example a painting can be a portrait, a landscape, etc.). In keeping this data no defining classification information of the works. |
| Secure recording of the insurance value for each piece of work | The new database records current and past insurance value for piece of work in all the partner museums while preventing non-authorized personnel from accessing it. |
| Keeps track of transactions involving a piece of work and any of the five museums. | The new database design keeps a detailed history of all works borrowed to, lent out by, sold by, or bought by any of the museums. The date of each transaction as well as a return date if the work has been lent out by or lent to one the museums can always be accessed to enable access of information related to individual transactions. Information on whether a work has been exhibitions, transactions, and whether a work is not under the ownership of one of the partner museums but has the potential to be borrowed can also be accessed. |
| Records ownership of each piece of work | The database holds information on the owner of a piece of work for all works which sold, bought by a museum, can be borrowed or have been borrowed. This can resolve issues relating to when a purchaser a work or one of the museums gained possession of an item. |
| Organized and descriptive categorization for each piece of work | The new database categorizes each piece of work according the physical properties of the piece of work with a deeper classification. Pieces of work may also be categorized based on conceptual themes which may describe features of them including the era or region a work comes from, or whether a piece of work relates to another area of life. These themes can aid in planning of current, past, and obtaining information on a piece of work by enabling a user to find a work based on a descriptive word. This information may have been derived from past classification of pieces of work in the old databases or from the descriptions for the pieces of work. All information describing what a piece is about or any non-exclusive classifications can be recorded with this feature. |
| Records a detailed history for the time and place of each piece of work | For security and insurance reasons, the location of a piece of work at any point in time since the work has been entered into any of the museums databases can be accessed, including instances where a work belonging to the museum travels out of the museum. This feature can also be used to obtain the date a piece of work was acquired by one of the partner museums. |

**Functionalities relating to exhibitions of the museums**

|  |  |
| --- | --- |
| Functionalities | Functionality description |
| Exhibition planning | The new database design gives full control over planning and management of exhibitions. This includes the ability to:   * plan and assign new exhibitions to any of the existing partner museums * assign an exhibition to take place in multiple locations (i.e. galleries) within the same museum. The same exhibition can be planned for separate locations connected by a door. * Re-plan an exhibition multiple times with the option of expanding and updating the exhibition’s collection each time. * Have exhibitions to present pieces of work borrowed from one of the partner museums or from another owner. * Access a detailed record of all past, current, and future exhibitions including the date each exhibition started, ended, or is planned to be started as well as a description, the location of and works presented in each exhibition. This feature is included to enable access to information of exhibitions which have occurred throughout each museum’s history or will occur in the museum’s future. Exhibitions by the same name at different points in time can be distinguished. |
|
| Travelling Exhibition planning | The new database design allows gives full control over planning and management of traveling exhibitions. This includes the ability to   * Create a new traveling exhibition or assign a traveling exhibition for one of the museums exhibitions. * Access information relating to enter, edit, or future traveling exhibitions including each of the locations for the exhibition, the time it was in that location, the departure and return date of the exhibition from one of the museums, the insured value of the exhibition, as well as those sponsoring the exhibition and security personnel will the ability to update and add data on future traveling exhibitions. * Allowing traveling exhibitions to have multiple sponsors. |
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**Functionalities relating to locations of the museum**

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| --- | --- |
| Functionalities | Functionality description |
| The ability to handle information relating to each location of the partner museums. | The new database gives the ability to assign, update, andenter, edit, or remove information on locations relating to each museum. It can handle information on the name, suggested maximum and minimum capacity, and the dimensions for a location. |
| Holding general information about doors between rooms | The new database gives the ability to enter, edit or remove information on doors between locations in the museum including rooms connected by a door and if a room is not available due to maintenance, another planned exhibition or other reasons. |

**Functionalities related to traveling exhibitions**

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| --- | --- |
| Functionalities | Functionalities description |
| The ability to handle information identifying traveling exhibitions | The new database gives the ability to assign and update and view information identifying the traveling exhibitions including the exhibition name and start and end date of the exhibition. Information can be viewed for any traveling exhibition planned in the museum's history |
| Handling of information relating to the locations of traveling exhibitions | The database can IT, security, or view information relating to each location of a traveling exhibition including the place of the location, the date the exhibition began and ended in a location, and a contact phone number for someone at the destination. |
| Handling of information relating to sponsors | The new database can handle information relating to multiple sponsors of a traveling exhibition |
| Handling of information relating to the insurance of traveling exhibitions | Travelling exhibitions are more at risk for potential mishandling of a piece of work and have an increased insurance value based on the insurance values of the pieces of work |

**Functionalities relating to a Transaction for a Work**

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| --- | --- |
| Functionalities | Functionalities description |
| Purchasing a work | When purchasing a piece of work, the piece is added into work data with the owner and museum assigned to the museum which it arrived at. This enables access to information which can be quickly in a museum's possession |
| Selling a work | The location of the work is assigned to be not in the museum, the owner of the work is assigned the buyer in this transaction. By keeping the work in the database information can be accessed regarding past uses of this piece of work as well as information for the buyer in case this person must be contacted. |
| Borrowing a work | If a work has never been borrowed the data for it is entered into the database system. The location of a work is always updated when a work it borrowed and the start and end dates of the borrowing are recording. The end date can be edited if this is needed. |
| Loaning a work | The location of the work is set to be not in the museum and the start and end dates of the loan are recorded. |

**Simplified E-R Diagram**



**Database Security and Privacy**

For security and insurance reasons the location of a work at any time since the museum has been dealing with a work can be accessed on a date and time basis. For items moving between locations in the same museum the time it starts in one location is recorded as the end date for its previous location; however, this does not happen for transfers between partner museums.



(Figure 1.4 authority for different role and positions)

The figure 1.4 shows that different role could access or view different parts of database.

The merged museum database is used by different people with different responsibilities and privileges relating to it. People can view different information from the database depending on their role. Roles people may have pertaining to the database can be employee roles such a patron, work, exhibition, and building maintenance or roles of an outsider including a visitor and sponsor of the traveling museum. Each person does not require access to all information and some information can be dangerous to freely give out, such as allowing a visitor to view insurance values of a piece of work. Below is a description of roles and what this person may access pertaining to the database as shown in figure 1.4.

|  |  |
| --- | --- |
| Role | Role Description |
| Patron | The patron is the museum manager and has privileges of accessing all information from the database containing information of all 5 partner museums. |
| IT | IT need access to all parts of the database for the develop of software such as the website of the museum, developing applications and managing the database itself. |
| Security | Security are restricted to viewing information on locations, exhibitions, items, and visitors including traveling exhibitions in order to maintain safety and to have the ability to access and provide information in the case of an unfortunate incident. |
| Building maintenance | The building maintenance are restricted to accessing and editing information on the locations and doors because they only need to perform maintenance on the physical structures of the building itself. |
| Visitor | Visitors are people who visit the museum, and view online sources such as a website or museum app which access the database. These people have limited authority and cannot edit or create information but are able to view information on pieces of sold, borrowed, or locations of the museums with the exception of private information like the insurance value of a work and current and upcoming exhibitions. |
| Sponsor | Sponsors support the partner museums by sponsoring traveling exhibitions. These people therefore can have access to information relating to the traveling exhibitions and pieces of work in case they want further input on what works are involved in a traveling exhibition. |

**Addition of Temporal Data to the Database**

Some information in the database is temporal meaning there is a date attached to the information. Information for the same data which is valid now is the information with the most recent date attached to it. By attaching a time period to data, it becomes possible to store history relating to different states of data. A first step in our design towards a temporal database thus is to attach a time and date to entities.

Below is a list of all data that will accurately record the date-time history of all events happening in all museums combined:

1. Our database stores temporal data for the location of any piece of work. It is common in for piece to be moved from one location to another in the same museum when for example, works are moved from a gallery to storage. In our combined museum database it is likely for an item to be transferred from one museum to another partner museum. Our database design keeps track of the history of all transfers within a museum and between museums. For every work, the database records the date and time the work is inserted into or moved out of its location. Because moving an item within a museum takes only a short time, the start date and time an item was moved into a location is recorded as the end date and time for the previous location as long as the item only changed location within the same museum. Our database also allows planning future locations of any work in the museum collections. (i.e. works can be planned to be inserted in a certain gallery of a certain museum at a future date and time.). This aids in security of a work and can be helpful for insurance purposes because the place of a work at any point in time in while it was in the museums' system can be located, with the exception of when a work is given to someone else because then the work is the responsibility of this person. The exhibition of each work can also be accessed apart from the location of the exhibition itself.
2. Our database stores temporal data for all changes in works ownership. This includes keeping track of purchased, borrowed, loaned, and sold items. Once an item is sold, future changes in ownership are not recorded as they do not the museum unless the work returns to the museum. By recording the owner at all points in time if a person should be contacted pertaining to the work this person owns, this can be done. If a work can be potentially borrowed this is not temporal data as a date cannot be attached to it, but any work can be identified as to whether it is “borrowable” or not.
3. Transactions have a date and time attached to them as multiple transactions can happen for the same item. It can also be helpful to have the date and time of a transaction for purposes of security, taxes, etc. Transactions include if a work is purchased, sold, lent, or lent out. Entering a transaction which is a buy or a sale of a work automatically creates temporal data for the owner of a work. This feature can also be used to record the date and time a work was damaged, was found to be missing, or was donated which can give more detailed information for security and insurance purposes including police reports. Temporal data for location of a work is automatically entered as appropriate depending on whether a work is bought, sold, lent or borrowed.
4. Exhibitions and the location of exhibitions are also temporal data as the same exhibition can occur at different dates also different locations and therefore the time of an exhibition is needed to differentiate between occurrences of similar exhibitions by the same name.

Below is a more detailed explanation of information pertaining to a time frame for data and the benefits of having information for the given data at every point in time.

**The Location and Exhibition of a piece of work**

* For some of the museum databases this will involve the implementation of new temporal data

|  |  |
| --- | --- |
| Timeframe | Explanation and benefits of data recorded in the time frame |
| Past | Keeps track of all history relating to the history of a piece of work. This can be useful in situations of security and insurance where a work could have been harmed or gone missing. |
| Current | Records the current location of a piece of work. This is useful for identifying the location of any work in the museum's database and can aid in planning exhibitions. |
| Future | Records where works are planned to be at future dates. This can aid in planning of exhibitions and other functions because all advance notice of where items should be can be accessed. |

**Exhibitions,** including the works and locations of exhibitions

|  |  |
| --- | --- |
| Timeframe | Explanation and benefits of data recorded in the time frame |
| Past | Keeps a detailed history for the dates of past exhibitions which can aid in planning of future exhibitions. Tracks when works and locations are had been booked for the benefit of consideration of future exhibitions or traveling exhibitions and can aid in planning of museum resources. |
| Current | Keep track of all information pertaining to exhibitions which are ongoing and gives better a more detailed handling of works which are currently out of use due to exhibitions. In the case of traveling exhibitions, data which is current can aid in control of the status of the traveling exhibition, such as the need to locate the current point of a traveling exhibition. This can also be helpful for visitors of the museum to know what is ongoing. |
| Future | Tracks when works and locations are booked for future exhibitions or traveling exhibitions and can aid in museum planning of resources. Visitors also appreciate being able to access information about exhibitions planned in the future. |

The **owner** of a work

|  |  |
| --- | --- |
| Timeframe | Explanation and benefits of data recorded in the time frame |
| Past | The owner of a piece of work is recorded when the museum is entered into the museum database. When transferring owners it can be helpful to know who has owned it lasts for security and insurance reasons. |
| Current | Keeps track of the work’s owner and gives control and organization over locating a work. |

All **transactions** will be past data; however there are multiple types of transactions for which it can be useful to access past data. Below is a detailed table explaining the handling of transaction data.

|  |  |
| --- | --- |
| Type of Transaction | Detail |
| Buy and Sell | When one of the museums buys or sells a work, at any point of time it is necessary to be able to access this information for security, insurance, and accounting purposes. |
| Loan and Borrow | All information for loans and borrowing can be accessed at any point and will be helpful for security and insurance purposes. |
| Missing | The date when a work was first noticed to be missing is helpful for many reasons relating to history about the work. In this case the owner of the work would not automatically change. |
| Donated | Useful in determining how a work came into possession of the museum if for example the donor should be commemorated some day for their contribution to the museum. In the case of a donation the previous owner should be recorded with the same date the piece was given to the museum as the actual date the donor received the work may not be accessible. |
| Damaged | Records all points in time for which an item was noticed to be damaged and can help in determining what methods of organization of the works and other factors can contribute to the damaging of a work and possibly changes in insurance value of a work. |

Thank-you for the opportunity to design a functional database for the museum merger.

Following is a table of links which will redirect you to the official website of each museum

Appendix A

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| --- | --- |
| Museum name | Link |
| The Frick Collection | <http://www.frick.org/> |
| Indianapolis Museum of Art | <http://www.imamuseum.org/> |
| Smithsonian American Art Museum | <http://americanart.si.edu/> |
| Israel Museum | <http://www.imj.org.il/en/> |
| Canadian Science and Technology Museum | <http://cstmuseum.techno-science.ca/en/> |