Hospitals are an integral part of our society. They provide healthcare that is needed for everyone while acting like a local hub of research and advancements in human physiology. The staff at the hospital will need a Database to store the information collected from patients to optimize the delivery of their healthcare services. A database in a hospital would have many different users and entities. Our cumulative entities can be broken down into strong and weak entities.

The initial strong entity, “Patient,” encompasses attributes such as “Name”, “Age", “Date of Birth”, “Biological Gender”, and “Health Card Number”. The data will be quasi-static, dynamic, static, static, and static respectively. The data-types in the same order as was listed before will be “String” with a length of 100, “Integer” with a length of 3, “String” with a length of 11, “String” with a length of 7, and “String”with a length of 20. The attribute type for “Name” would be stored, single value, composite attribute; for “Age” it will be derived, single valued, simple attribute; for “Date of Birth” it will be stored, single valued, simple attribute; for “Biological Gender” it will be, stored, single valued, simple attribute; for “Health Card Number” it will be stored, single value, simple attribute. The attribute ‘Name’ is composite and will therefore have the simple attributes “First Name” and “Last Name” under it, where its data would be quasi-static for both and the data-types will be “String” length 20, and “String” length 20 respectively. The attribute type for both will be stored, single value simple attributes. “Health Card Number” will be the key attribute for the ‘Patient’ entity. The attribute “Age” is derived from “Date of Birth”. The reason these attributes were chosen was because this information is unique specifically to individual patients. The patient will have a 1-to-1 binary relationship with "Health Record" and "Insurance"; and a one to many binary relationship with “Emergency Contact” and "Hospital". The Patient class will also pass a foreign key to Emergency Contact since Emergency Contact is a weak entity. The Foreign key, “Health Card Number”, will be the primary key of the “Patient” entity.

The weak entity under the Patient is “Emergency Contact” and it has three attributes: “Name”, “Address”, and “Phone Number”. The data type for each is quasi-static, “String”, and “String”. The reason why “Phone Number” was chosen as “String” and not Integer is to include dashes for ease of readability and organization i.e (647-428-1982). The attribute type for “Name” is derived, single value, simple attribute; for “Address” it’s stored, single value, simple attribute; for “Phone Number” it’s stored, multi-valued, simple the foreign key is “Health Card Number” from the “Patient” entity.

The second strong entity is "Health Record" and the attributes for it are "Organ Donor", "Health Record ID", “Immunization”, and "Vital Information". The data for the attributes are quasi-static, static, quasi-static, and quasi-static. The data-type for each is “String” with a length of 3, “String” with a length of 20, “String” with a length of 20, and “String” with a length of 20. The reason why “String” was chosen for “Health Record ID” is because the ID can contain both letters and numbers. The attribute for “Organ Donor” would be stored, single valued, simple

attribute; for “Health Record ID” it would be stored, single valued, simple attribute; for “Immunization” it would be stored, single valued, simple attribute; for “Vital Information” it would be stored, single valued, simple attribute. These four attributes are included in the “Health Record” entity because they provide essential information about the patient's ongoing medical history and treatment. In contrast, “Health Record ID” remains the key attribute. This strong entity will also have a 1-to-many ternary relationship with “Operations” and “Medication”. It will pass on the “Health Record ID” as a foreign key to the weak entity ‘Medication’.

The weak entity ‘Medication’ has four attributes, “Brand”, “Side effects”, “Medication ID”, and “Dosage”. The data for the four are static, static, static, and quasi-static. The data types for the four are “String” with length 20, “String” with length 20, “String” with length 10, and “String” with length 20. The reason why “Medication ID” is a string is because it has both letters and numbers. The attribute type for “Brand” is a stored, single valued, simple attribute; for “Side-effects” it is a stored, single valued, simple attribute; for “Medication ID” it is a stored, single valued, simple attribute; for “Dosage” it is a stored, single valued, simple attribute. The key attribute is “Medication ID” and its foreign key passed from “Health Record” is “Health Record ID”.

The weak entity ‘Operations’ has three attributes, “Surgery Name”, “Surgery ID”, and “Surgeon Name”. The data respectively are static, static, quasi-static. The data-type with respect to the attributes is “String” with length 20, “String” with length 20, and “Surgeon Name” with length 35. The attribute type for “Surgery Name” is stored, single valued, simple attribute; for “Surgery ID” it’s stored, single valued, simple attribute; for “Surgeon Name” it’s stored, single valued, simple attribute. The key attribute is “Surgery ID” and its foreign key passed from “Health Record” is “Health Record ID”.

The third strong entity is "Insurance" and the attributes for it are "Insurance Provider" and "Insurance Number". The data is quasi-static and quasi-static, respectively, and its key attribute is the “Insurance Number” which is unique for each patient. The data-type for each of its attributes respectfully is “String” length of 50, and “String” with a length of 25. The attribute type for “Insurance Provider” is stored, single valued, simple attribute; for “Insurance Number” it is stored, single valued, simple attribute. For this entity, it's essential to note that we will be looking for government aid as Canadian residents/citizens 19 or younger have many medical procedures/tests paid for by the Government of Ontario. So, it is essential to check the birth date from the first entity, "Patient". For some data sets, the Insurance Provider would be the Government of Ontario/Canada. This Strong entity will also have a 1-to-many binary relationship with “Coverage Details”. Also this foreign key to both “Coverage Details”.

The weak entity “Coverage Details” has 3 attributes, “Coverage Type”, “Co-pay Amounts”, and “Policy Inclusion Status”. The data for each respectively is static, static, quasi-static. The data-type for the attributes is “String” with a length of 20, “Integer” with a length of 8, and “Sting” with a length of 20. The Attribute type for “Coverage Type” is stored, single valued, simple attribute; for “Co-pay Amounts” it’s stored, single valued, simple attribute;

for “Policy Inclusion Status” it’s stored, single valued, simple attribute. The key attribute is “Coverage Type” and its foreign key from “Insurance” is “Insurance Number”.

The fourth strong entity is “Hospital”, its attributes are “Hospital ID”, “Name”, and “Address”. Address is a single valued, composite attribute with 3 attributes under it: “Postal Code”, “City”, and “Street”. The data type for the 3 are quasi-static for all. The data type for “Name” and “Hospital ID” is static for both. For the stored, single valued, simple attributes: “Hospital ID” is a “String” with a length of 20, and “Name” is a “String” with length of 20; for the 3 other stored, single valued, simple attributes under “Address” are “Postal Code” is a “String” with a length of 6, “City” is a “String” with a length of 20, and “Street” is a “String” with a length of 20. The key attribute is “Hospital ID”. This Strong entity will also have a many-to-one binary relationship with “Staff”.

The weak entity “Staff” will have attributes “Department” and “Employee ID”. The data type is static for both. The data type for “Department” is “String” with length of 20, and data type for “Employee ID” is “String” with length of 20. The key attribute is “Employee ID”. The attribute type for “Department” is stored, single valued, simple attribute; for “Employee ID” it’s stored , single valued, simple attribute. This weak entity also has specialization of one-to-many ternary relations with “Maintenance”, “Assigned Nurse”, and “Doctor”. “Doctor” has the quasi-static attribute “Speciality” (is a “String” with a length of 20). “Assigned Nurse” has the static attribute “Type of Nurse”(is a “String” with a length of 20). “Maintenance” has the dynamic attribute “Ward”(is a “String” with a length of 20). The foreign key for this attribute is “ Hospital ID”.