



**CSCI 5408**

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**Assignment 1**  
Problem 1

| Entity                | Reasons   | Source   |
|-----------------------|---|--|
| Academic Advisor      | <p>This entity represents employees who are employed by the university to support students, applying to various programs, who have issues related to their academic record, academic regulations, registration. They also help students explore all the options available to them to pay for their university education.</p> <p>This entity is a valid entity since it stores information about the various advisors that are available to support students.</p> <p>This is a strong entity as its existence is not associated with any strong entities and each instance of an academic advisor can be uniquely identified through Advisor_Id.</p> | <p><a href="https://www.dal.ca/admissions/contactus.html">https://www.dal.ca/admissions/contactus.html</a></p> <p><a href="https://www.msvu.ca/campus-life/centre-for-academic-advising-and-student-success/academic-advising/">https://www.msvu.ca/campus-life/centre-for-academic-advising-and-student-success/academic-advising/</a></p> <p><a href="https://www.smu.ca/academics/academic-advising.html">https://www.smu.ca/academics/academic-advising.html</a></p> |
| Admissions            | <p>This entity represents each application submitted by prospective students to a university. An application will contain student information and program information, application date and supporting documents.</p> <p>This entity is valid since it's like a "Fact Table" which contains historical and present data of applications. Attributes include Program, Application Fee and Date.</p> <p>Each application is associated with an Application Id.</p> <p>This is a weak entity since it is associated with the entity <b>Student</b>.</p>  | <p><a href="https://www.dal.ca/admissions.html">https://www.dal.ca/admissions.html</a></p> <p><a href="https://www.msvu.ca/campus-life/registrar-office/admissions/">https://www.msvu.ca/campus-life/registrar-office/admissions/</a></p> <p><a href="https://www.smu.ca/future-students/cs-apply-online.html">https://www.smu.ca/future-students/cs-apply-online.html</a></p>   |
| Awards & Scholarships | <p>This entity details the various forms of Scholarships and Grants that are available for students to apply for.</p> <p>This entity is valid since it records the attributes of the scholarships offered by the various faculties.</p> <p>This entity is weak since it's dependent on the Entity - "Faculty".</p>  | <p><a href="https://www.dal.ca/admissions/money_matters/awards-financial-aid.html">https://www.dal.ca/admissions/money_matters/awards-financial-aid.html</a></p> <p><a href="https://www.msvu.ca/alumni-donors/become-a-mentor-volunteer/join-the-alumnae-association/awards-scholarships/">https://www.msvu.ca/alumni-donors/become-a-mentor-volunteer/join-the-alumnae-association/awards-scholarships/</a></p>  |

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|           |  | <a href="https://www.smu.ca/future-students/mm-scholarships-and-awards.html">https://www.smu.ca/future-students/mm-scholarships-and-awards.html</a>   |
| Buildings | <p>Buildings refer to the various architectural sites that are available throughout each campus. Each building has an address, name, number of rooms and Id.</p> <p>This entity is Strong as it does not depend on any other Entity and can be uniquely identified by its address.</p>   | <a href="https://www.dal.ca/campus-maps/building-directory.html">https://www.dal.ca/campus-maps/building-directory.html</a><br><br><a href="https://www.msvu.ca/campus-life/a-z-list/">https://www.msvu.ca/campus-life/a-z-list/</a><br><br><a href="https://www.smu.ca/studentlife/studentplacespaces/">https://www.smu.ca/studentlife/studentplacespaces/</a> |
| Bookstore | <p>A bookstore is a Strong entity since it can be uniquely identified by it's name and location. However, each University may have <b>zero or more</b> bookstores, as materials, books and merchandise may be available through other outlets.</p>   | <a href="https://bookstore.dal.ca/">https://bookstore.dal.ca/</a><br><br><a href="https://www.msvu.ca/campus-life/campus-services/the-mount-bookstore/">https://www.msvu.ca/campus-life/campus-services/the-mount-bookstore/</a><br><br><a href="https://shop.smu.ca/">https://shop.smu.ca/</a>   |
| Campus    | <p>This entity is a strong entity. Each campus can be uniquely identified through a combination of the University Name and the location of the Campus. Each campus is associated with a location, name and description. This entity is valid since it provides details on the various campuses that're available in a university.</p> <p>However, not every University has multiple campuses (some just have a primary campus), therefore each University can have <b>zero or more</b> Campuses.</p> | <a href="https://www.dal.ca/about-dal/campus-experience.html">https://www.dal.ca/about-dal/campus-experience.html</a>   |

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| Clubs              | <p>This entity describes the various clubs that are available in a university, for students to partake.</p> <p>It's a strong entity as clubs will always exist irrespective of student participation. Each club has a name, number of members, meeting location and club coordinator.</p>   | <a href="https://www.dsu.ca/connect-with-societies">https://www.dsu.ca/connect-with-societies</a><br><br><a href="https://www.msvu.ca/international/advising-for-current-international-students/international-clubs-societies/">https://www.msvu.ca/international/advising-for-current-international-students/international-clubs-societies/</a><br><br><a href="https://www.smu.ca/campus-life/clubs-and-societies.html">https://www.smu.ca/campus-life/clubs-and-societies.html</a>   |
| Community Services | <p>This represents the various services provided by the University. This is a strong entity as it does not depend on any other entity, it can be uniquely identified by a Service_ID. It is a valid entity as it has details on various services, the community it caters to and a description.</p>   | <a href="https://www.dal.ca/campus_life/communities.html">https://www.dal.ca/campus_life/communities.html</a><br><br><a href="https://www.msvu.ca/campus-life/student-equity-diversity-inclusion/">https://www.msvu.ca/campus-life/student-equity-diversity-inclusion/</a><br><br><a href="https://www.smu.ca/saas/index.html">https://www.smu.ca/saas/index.html</a>   |
| Courses            | <p>This entity represents the various courses offered, the type of courses (lecture, theory, OR lab). This is a strong entity as it's not dependent on other entities. <b>It's possible for 1 course to belong to multiple programs.</b> Its unique ID is Course ID. This is a valid entity because it has all the details related to a course like name, instructor, meeting location and course duration.</p> | <a href="https://www.dal.ca/academics/programs/graduate/applied-computer-science/program-overview/courses.html">https://www.dal.ca/academics/programs/graduate/applied-computer-science/program-overview/courses.html</a><br><br><a href="https://www.msvu.ca/academics/bachelor-of-science-bsc/computer-science/courses/">https://www.msvu.ca/academics/bachelor-of-science-bsc/computer-science/courses/</a><br><br><a href="https://www.smu.ca/academics/ar-choose-your-courses.html">https://www.smu.ca/academics/ar-choose-your-courses.html</a> |
| Identity Card      | <p>This entity represents the ID card provided to students that can be used to avail various services. It is a strong entity as it does not</p>   | <a href="https://dalcards.dal.ca/Account/LogOn">https://dalcards.dal.ca/Account/LogOn</a>   |

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|                 | depend on any other entity. This is a valid entity as it has various details like monetary balance, proxy ID, student ID and general information.  | <a href="https://www.msvu.ca/academics/library/services/library-distance-services/request-update-an-id-card-online-form/">https://www.msvu.ca/academics/library/services/library-distance-services/request-update-an-id-card-online-form/</a><br><br><a href="https://smuniversity.qualtrics.com/jfe/form/SV0dN1MfLzzyePRk1">https://smuniversity.qualtrics.com/jfe/form/SV0dN1MfLzzyePRk1</a>   |
| Staff / Faculty | <p>This entity details information on the various Staff OR Faculty members who are employed by a university.</p> <p>This Entity is a strong entity as each instance can be uniquely identified by an employee_id and start_date.</p>   | <a href="https://directory.dal.ca/">https://directory.dal.ca/</a><br><br><a href="https://www.msvu.ca/academics/bachelor-of-arts-ba/philosophy-and-religion/faculty-profiles/">https://www.msvu.ca/academics/bachelor-of-arts-ba/philosophy-and-religion/faculty-profiles/</a><br>(One instance of faculty profiles)<br><br><a href="https://www.smu.ca/research/faculty-profiles.html">https://www.smu.ca/research/faculty-profiles.html</a>  |
| Events          | <p>This entity describes the various that a University hosts. This entity is weak since it's associated with the entity – University and can be uniquely identified by combining the University Id with the Event_Id and date.</p> <p>Each event has an ID, description, conduct_date and event manager.</p> | <a href="https://www.dal.ca/campus_life/health-and-wellness/my-health/workshops-and-events/dal-after-dark.html">https://www.dal.ca/campus_life/health-and-wellness/my-health/workshops-and-events/dal-after-dark.html</a><br><br><a href="https://www.dal.ca/campus_life/student-events.html">https://www.dal.ca/campus_life/student-events.html</a><br><br><a href="https://www.msvu.ca/campus-life/career-services/events-workshop-materials/">https://www.msvu.ca/campus-life/career-services/events-workshop-materials/</a><br><br><a href="https://www.smu.ca/events/welcome.html">https://www.smu.ca/events/welcome.html</a> |

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|-----------------------------------|--|---|
| Libraries                         | <p>This Entity describes the Libraries that are established in a University. Each Library is associated with a Campus and not a University in order to resolve Fan Traps.</p> <p>Each Library has an Id, Location, Name, specialty (Example: Law, Medical Sciences and Engineering) and number of books.</p>   | <a href="https://libraries.dal.ca/">https://libraries.dal.ca/</a><br><a href="https://www.msvu.ca/academics/library/">https://www.msvu.ca/academics/library/</a><br><a href="https://www.smu.ca/about/institutional-research-library.html">https://www.smu.ca/about/institutional-research-library.html</a>   |
| Faculties                         | <p>This entity represents the various faculties that a university comprises of. This entity is a strong entity as it can be uniquely identified by its Id and name. Each Faculty is associated with an Id, name, description, number of staff and Chairperson.</p> <p>This entity is valid as it stores information about the various domains a university is affiliated with and offers comprehensive information for prospective students.</p> | <a href="https://www.dal.ca/academics/faculties.html">https://www.dal.ca/academics/faculties.html</a> <a href="#">Cou</a><br><a href="https://www.msvu.ca/academics/">https://www.msvu.ca/academics/</a><br><a href="https://www.smu.ca/academics/academic-programs-landing.html">https://www.smu.ca/academics/academic-programs-landing.html</a>   |
| International Centre Appointments | <p>Each instance of this entity represents an appointment made by students with the International Centre.</p> <p>This entity is valid since it stores historical and present-day information each appointment made.</p> <p>Each Appointment is associated with an Id, date, student_id, employee_id (person whom the student consulted) and a description of the appointment.</p>  | <a href="https://www.dal.ca/campus_life/international-centre/contact-us.html">https://www.dal.ca/campus_life/international-centre/contact-us.html</a><br><a href="https://www.msvu.ca/international">https://www.msvu.ca/international</a><br><a href="https://www.smu.ca/international/the-international-centre.html">https://www.smu.ca/international/the-international-centre.html</a> |
| Intramurals                       | <p>Each instance of this entity represents an Intramurals competition that students can participate in.</p>  | <a href="https://athletics.dal.ca/campus-recreation/intramurals.html">https://athletics.dal.ca/campus-recreation/intramurals.html</a>   |

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|             | <p>This entity is valid as it records participation information and the details of each competition (such as Wins/Losses).</p> <p>Each instance has an Id, date, description, coordinator_id and winner details.</p>  | <p><a href="https://www.msvu.ca/about-msvu/event-calendar/pickleball-intramurals-for-msvu-residence-students/">https://www.msvu.ca/about-msvu/event-calendar/pickleball-intramurals-for-msvu-residence-students/</a></p> <p><a href="https://www.smu.ca/campus-life/smufit-intramurals.html">https://www.smu.ca/campus-life/smufit-intramurals.html</a></p> |
| IT Services | <p>A student / Faculty can avail different types of IT services and this entity represents each service availed by a person.</p> <p>This entity is valid since it records the services requested by people and would provide comprehensive information in case of a need for further details.</p> <p>Each instance has an Id, Service description, type, date and service_provider_id (person who completed the request).</p> | <p><a href="https://www.dal.ca/dept/its/current.html">https://www.dal.ca/dept/its/current.html</a></p> <p><a href="https://www.msvu.ca/campus-life/campus-services/it-services/">https://www.msvu.ca/campus-life/campus-services/it-services/</a></p>   |
| News        | <p>This entity represents all the news articles that are published in a campus. This is a strong entity as it does not depend on any other entity, The unique id is news_ID.</p> <p>This is a valid entity as it has contains details about articles that are published on a regular basis in a university.</p> <p>Each news article has a date, Id, author and title.</p>  | <p><a href="https://www.dal.ca/news.html">https://www.dal.ca/news.html</a></p> <p><a href="https://www.msvu.ca/about-msvu/media-centre-news/">https://www.msvu.ca/about-msvu/media-centre-news/</a></p> <p><a href="https://www.smu.ca/research/gorsebrook-events-conferences.html">https://www.smu.ca/research/gorsebrook-events-conferences.html</a></p>  |

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| Programs       | <p>This entity represents the programs offered by each Faculty. Each program can belong to only one Faculty.</p> <p>This entity is valid since it stores information about each program and helps students understand the program better before applying for it.</p> <p>Each entity has a program_id, name , description, vancancies, current_seats_available, waitlist and duration.</p>                   | <p><a href="https://www.dal.ca/academics/programs.html">https://www.dal.ca/academics/programs.html</a></p> <p><a href="https://smu-ca-public.courseleaf.com/graduate/programs/">https://smu-ca-public.courseleaf.com/graduate/programs/</a></p> <p><a href="https://www.msvu.ca/academics">https://www.msvu.ca/academics</a></p>   |
| Research Areas | <p>This entity elaborates the various research areas associated with a faculty.</p> <p>This entity is a weak entity as it cannot be uniquely identified with its primary keys (weak key) and is dependent on the entity Faculty.</p> <p>Each Research Area has an Id, domain, Instructor and number_of_research_students.</p>   | <p><a href="https://www.dal.ca/about-dal/world-class-research.html">https://www.dal.ca/about-dal/world-class-research.html</a></p> <p><a href="https://www.msvu.ca/research-at-the-mount">https://www.msvu.ca/research-at-the-mount</a></p> <p><a href="https://www.smu.ca/research/">https://www.smu.ca/research/</a></p>   |
| Residence      | <p>This entity describes the various residence halls that are available in a university. This is a valid entity since it records the number of rooms available for the perusal of students each year.</p> <p>This entity is a strong entity as it can be uniquely identified by its Id and address.</p> <p>Each entity has an id, address, location, number of rooms and current_occupancy information.</p> | <p><a href="https://www.dal.ca/campus_life/residence_housing.html">https://www.dal.ca/campus_life/residence_housing.html</a></p> <p><a href="https://www.msvu.ca/campus-life/residence-life-at-the-mount/">https://www.msvu.ca/campus-life/residence-life-at-the-mount/</a></p> <p><a href="https://www.smu.ca/campus-life/residences-and-housing.html">https://www.smu.ca/campus-life/residences-and-housing.html</a></p> |



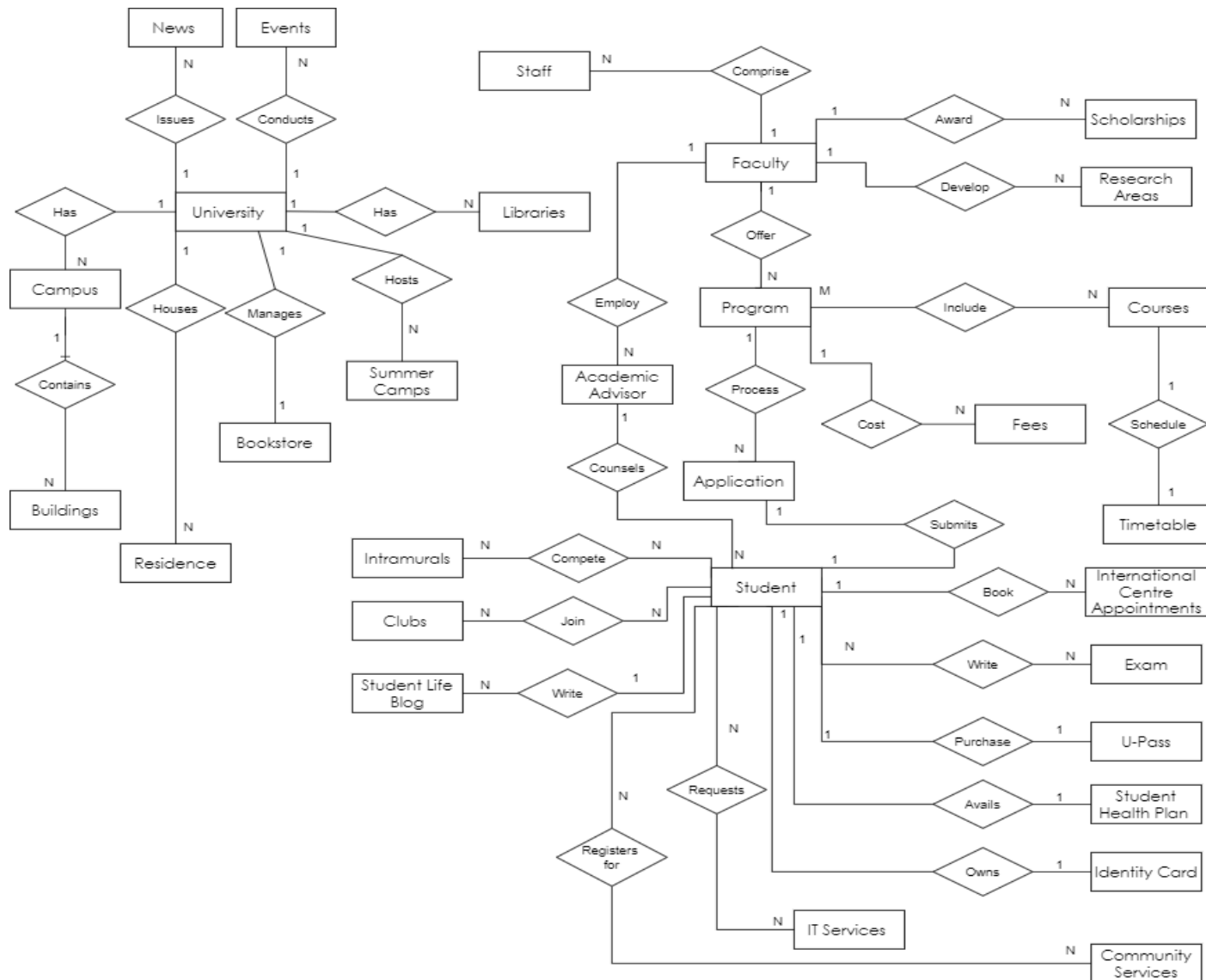
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| Student             | <p>This entity stands for each student that pursues a program in a university.</p> <p>It is a valid entity since it's useful to store information about current students for various analytical purposes and administration activities.</p> <p>This entity is a strong entity as it can be uniquely identified by a student's Id number.</p> <p>Each student has an Id, name, age, highest_qualification information and gender associated with them.</p> | <p><a href="https://www.dal.ca/current_students.html">https://www.dal.ca/current_students.html</a></p> <p><a href="https://www.msvu.ca/future-students">https://www.msvu.ca/future-students</a></p> <p><a href="https://www.smu.ca/fgsr/fgsr-current-students.html">https://www.smu.ca/fgsr/fgsr-current-students.html</a></p>   |
| Student Health Plan | <p>This entity describes the various Health plans offered by a university along with its cost and coverage details.</p> <p>It is a valid entity since it's useful to store Insurance plan details so that students can understand about the various plans before registering for them.</p> <p>This entity is a strong entity as Health plans aren't dependent on any other entity and can be uniquely identified by the type of plan.</p>                 | <p><a href="https://www.dal.ca/campus_life/health-and-wellness/my-insurance-plan.html">https://www.dal.ca/campus_life/health-and-wellness/my-insurance-plan.html</a></p> <p><a href="https://www.msvu.ca/international/advising-for-current-international-students/medical-insurance/">https://www.msvu.ca/international/advising-for-current-international-students/medical-insurance/</a></p> <p><a href="https://www.smu.ca/campus-life/insurance-medical-and-dental-insurance.html">https://www.smu.ca/campus-life/insurance-medical-and-dental-insurance.html</a></p> |

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|                   | Each entity has a Plan Id, type, cost, coverage_description and duration associated with it.  |   |
| Student Life Blog | <p>This entity represents each blog article written by current students.</p> <p>It is a valid entity since students can view the blog articles to learn about the experiences of current students.</p> <p>This entity is a weak entity as its existence depends upon the entity “Student”.</p> <p>Each entity has an article Id, date_published and author information.</p>   | <a href="https://studentlife.dal.ca/">https://studentlife.dal.ca/</a>   |
| Summer Camps      | <p>This entity describes camps that are hosted by universities in Summer.</p> <p>It is a valid entity since each instance of an entity represents details of a particular camp such as the number of participants permitted, camp cost and location</p> <p>This entity is a strong entity as it does not depend upon students or any other entity. Camps will be conducted irrespective of student participation (outsiders may participate as well).</p> | <a href="https://athletics.dal.ca/kids-and-camps/summer.html">https://athletics.dal.ca/kids-and-camps/summer.html</a><br><br><a href="https://www.msvu.ca/campus-life/mount-fitness-centre-and-campus-rec/camps-childrens-programs/summer-day-camps/">https://www.msvu.ca/campus-life/mount-fitness-centre-and-campus-rec/camps-childrens-programs/summer-day-camps/</a><br><br><a href="https://www.smu.ca/campus-life/smufit-camp.html">https://www.smu.ca/campus-life/smufit-camp.html</a> |

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| Timetable<br>(Depends on the Faculty therefore Weak Entity) | <p>This entity describes the academic timetable for each course.</p> <p>It is a valid entity since it provides information on the current course schedule and helps students analyze course schedules and prevent conflicts.</p> <p>This entity is a weak entity as it depends upon instances of the entity – Faculty.</p> | <p><a href="https://www.dal.ca/academics/academic_timetable.html">https://www.dal.ca/academics/academic_timetable.html</a></p> <p><a href="https://www.msvu.ca/academics/university-academic-calendars/">https://www.msvu.ca/academics/university-academic-calendars/</a></p> <p><a href="https://smu-ca-public.courseleaf.com/">https://smu-ca-public.courseleaf.com/</a></p>   |
| Tuition   | <p>This entity describes the tuition fee associated with each program.</p> <p>It is a valid entity since each university site has a “Money Matters” page which provides useful information on the fee structure of a program.</p> <p>This entity is a weak entity as it’s dependent on the entity – Faculty.</p>           | <p><a href="https://www.dal.ca/admissions/money_matters/tuition_payments.html">https://www.dal.ca/admissions/money_matters/tuition_payments.html</a></p> <p><a href="https://www.msvu.ca/future-students/money-matters/tuition-fees/">https://www.msvu.ca/future-students/money-matters/tuition-fees/</a></p> <p><a href="https://www.smu.ca/academics/tuition-fees-other-expenses.html">https://www.smu.ca/academics/tuition-fees-other-expenses.html</a></p> |
| U-Pass  | <p>This entity represents the transport pass offered by some universities in partnership with Halifax</p> <p>It is a valid entity since a student may choose to opt in or out of the plan and it’s necessary to store this information for administration purposes.</p>  | <p><a href="https://www.dal.ca/campus_life/UPass.html">https://www.dal.ca/campus_life/UPass.html</a></p> <p><a href="https://www.msvu.ca/future-students/money-matters/tuition-fees/u-pass-transit-info/">https://www.msvu.ca/future-students/money-matters/tuition-fees/u-pass-transit-info/</a></p> <p><a href="https://www.smu.ca/campus-life/public-transit-bus-pass.html">https://www.smu.ca/campus-life/public-transit-bus-pass.html</a></p>             |

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|            | This entity is a weak entity as it depends upon the existence of students.   |  |
| University | <p>This entity represents Universities in the database.</p> <p>It is a valid entity since it records vital information about each University such as total faculty, students, faculty-to-student ratio and number of citations.</p> <p>This entity is a strong entity as it can be uniquely identified by an identifier.</p> | <p><a href="https://www.dal.ca/about-dal.html">https://www.dal.ca/about-dal.html</a></p> <p><a href="https://www.msvu.ca/about-msvu">https://www.msvu.ca/about-msvu</a></p> <p><a href="https://www.smu.ca/about/welcome.html">https://www.smu.ca/about/welcome.html</a></p> |

## Initial ERD (Chen Model)



## Design Issues & Resolution

A detailed analysis of the Initial ER diagram revealed that there were multiple Fan Traps in the model. This was due to the fact that certain Entities were associated with the entity UNIVERSITY instead of an entity at a lower level, such as CAMPUS, resulted in these Fan Traps.

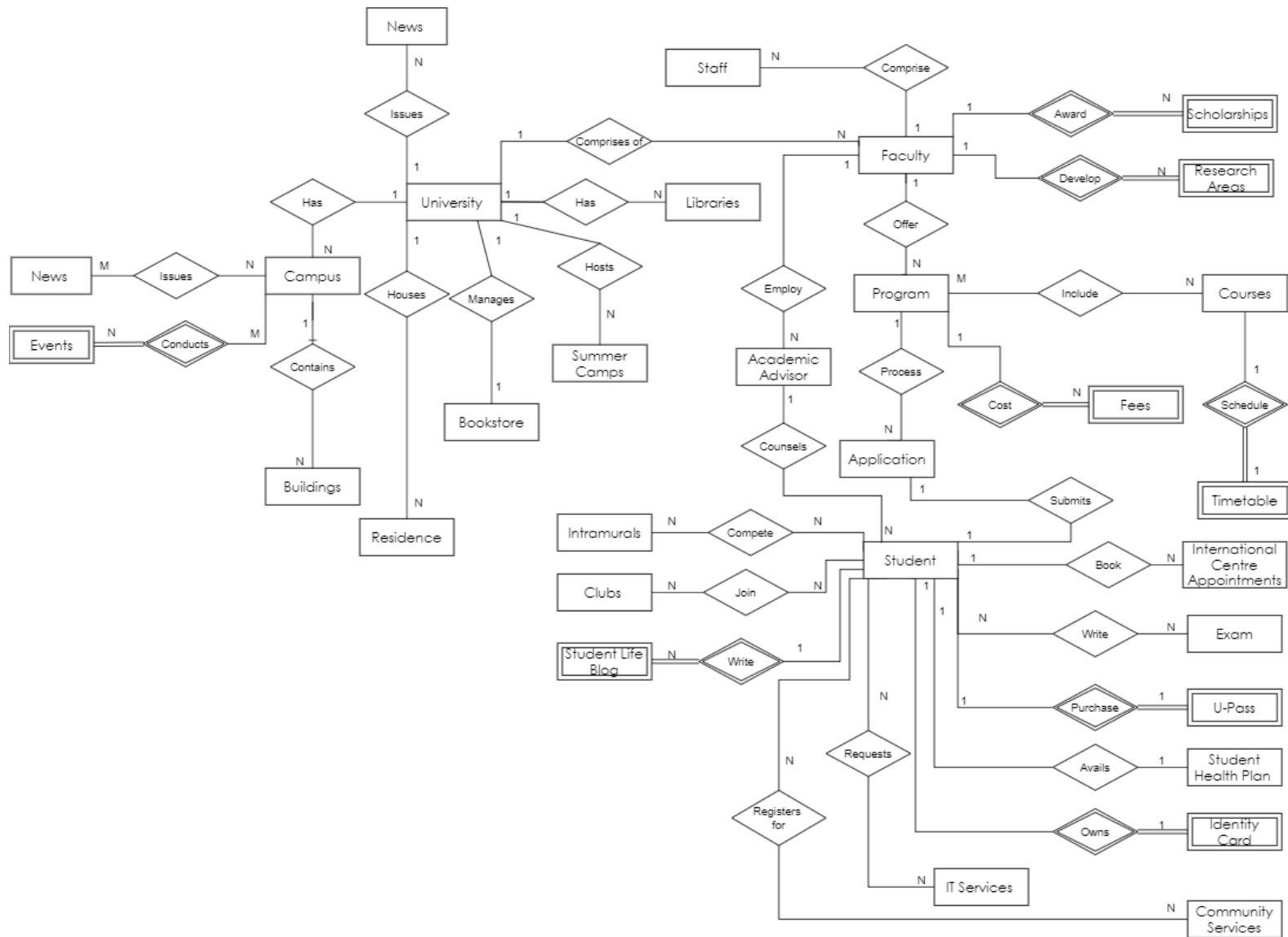
In addition, Time Variant Data was associated with a separate entity (which can be identified with a suffix – “HISTORICAL”).

Initially, UPASS, IDENTITY CARD and FEES were considered as strong entities but upon analysis it was determined that these are Weak entities since they are all dependent on the entity – “Student”.

Entities – EVENTS, TIMETABLE and RESEARCH AREAS were also determined to be Weak entities as they cannot be uniquely identified by their Primary keys (Weak keys) and are dependent on other Entities such as CAMPUS, COURSES & FACULTY respectively.

1. Resolved Fan Trap by removing relationship between UNIVERSITY & NEWS and establishing a relationship between NEWS & CAMPUS.
2. Resolved Fan Trap by removing relationship between UNIVERSITY & EVENTS and establishing a relationship between EVENTS & CAMPUS.
3. Resolved Fan Trap by removing relationship between UNIVERSITY & LIBRARY and establishing a relationship between LIBRARY & CAMPUS, since each campus can have 1 or more Libraries.
4. Established a relationship between University and Faculty to answer questions such as **"What are the various Faculties a University comprises of?"** & **"How many programs does a university offer?"**

## Final ERD



## References

1. CSCI 5408 Assignment 1 Handout
2. <https://www.conceptdraw.com>. 2022. Entity Relationship Diagram Symbols | Professional ERD Drawing. [online] Available at: <<https://www.conceptdraw.com/How-To-Guide/erd-entity-relationship-diagram-symbols>> [Accessed 25 January 2022].

## Declaration

I Benny Daniel Tharigopala, declare that in assignment 1 of CSCI 5408 course, data scrapping is not done programmatically or using any online or offline tools. However, the webpages or the domain mentioned in this document are visited manually, and some useful information is gathered for education purpose only. Information, such as email, personal contact numbers, or names of people are not extracted. The course instructor or the Faculty of Computer Science cannot be held responsible for any misuse of the extracted data.