Final Deliverable
SpinReserve Database Project

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Introduction

Motivation

Communal laundry facilities in on-campus housing often lead to long wait times, conflicts between students, and machine misuse. Binghamton University students face frequent issues in this regard, such as machines never being available at the right time, having to move other peoples' laundry for them/getting your laundry moved prematurely, and an overall lack of accountability and respect from fellow residents. These seemingly minute problems can culminate into wasted time, unneeded stress, and interpersonal conflict, disrupting what should be a straightforward chore in a student's weekly routine. We have experienced plenty of these issues ourselves over the years that each of us lived on campus at Binghamton University. When you live in a building like Cleveland Hall and there are only six washers and six dryers (assuming they all are working) for over two hundred people, sometimes the only time you can do laundry is at three o'clock on a Tuesday morning. Our experiences have inspired us to create an effective solution to a problem that affects nearly every college student in the country.

Goal

The goal of our database is to design a system that allows students to reserve laundry machines in on-campus residence halls. The system, which we have named *SpinReserve*, will allow students to check machine availability, reserve time slots dedicated to specified machines, and access said machines by scanning their Binghamton ID card, similar to when entering their residence hall or paying for dining hall food. The expected outcomes of this project are reduced wait times, fewer disputes over laundry machines, and an overall enhancement in laundry experience and efficiency at universities that employ our application.

Solution Proposal Summary

Our solution to this problem is to allow students to reserve machines on an enforced schedule, enabling more efficient usage and reduced tension among residents. Although some universities use *LaundryView*, which allows students to see current machine statuses, it lacks a reservation feature. A student may see an available machine online, only to find it in use moments later upon arrival. There is also no system to enforce or track usage behavior, report issues, or restrict access to machines based on dorm assignment. This gap in functionality inspired us to build a more robust and fair laundry management solution. Our proposed database system will keep track of student activity, residence hall assignments for students and machines, reservations, maintenance requests, culminating in a streamlined laundry process. *SpinReserve* uses comprehensive entity types with clearly defined properties and attributes to handle all required functionality in an efficient and digestible manner.

Solutions Review

Our Competitors

We have identified only one major alternative to our idea, *LaundryView*, which is already employed by Binghamton University. *LaundryView* lets students view the current status of each machine in each building through a 3D diorama of each laundry room. For example, if I wanted to do laundry in Rafuse, an exact digital recreation of the laundry room would be shown. Available machines are shown in white, "in use" machines are in red, and "out or order" machines are in gray. *LaundryView* does not, however, allow users to schedule reservations, restrict dorm-specific access control, or submit issue reports. Our application, *SpinReserve*, incorporates all those features and more.

Below is a table depicting two common features of our services, followed by five unique ones. When a student wants to make a reservation through *SpinReserve*, they will select a 2-hour and 15-minute block to do laundry. *SpinReserve* will then make two reservations for them, one for a washer and one for a dryer. Each reservation is 75 minutes, with the last 15 minutes of the washer reservation overlapping with the first 15 minutes of the dryer reservation, allowing ample time for students to switch over their clothes. The reservations will only be made for machines within a students assigned residence hall. Additionally, SpinReserve will assign the student to specific machines, allowing access through scanning their Binghamton student ID card. This produces an accurate record of which machines were used by which students, including the time and date of usage. These enhancements make *SpinReserve* a more versatile application for managing on-campus laundry resources.

Competitor Analysis Table (Fig. 1)

Competitor → Feature ↓	***LaundryView***	***SpinReserve***
View Machine Availability	✓	✓
Machine Type & Status Tracking	✓	✓
Reserve Machines	✗	✓
Check-In with Student ID	✗	✓
Track Machine Usage History	✗	✓
Submit Maintenance Requests	✗	✓
Restrict Reservations to Dorm	✗	✓

The Business Perspective

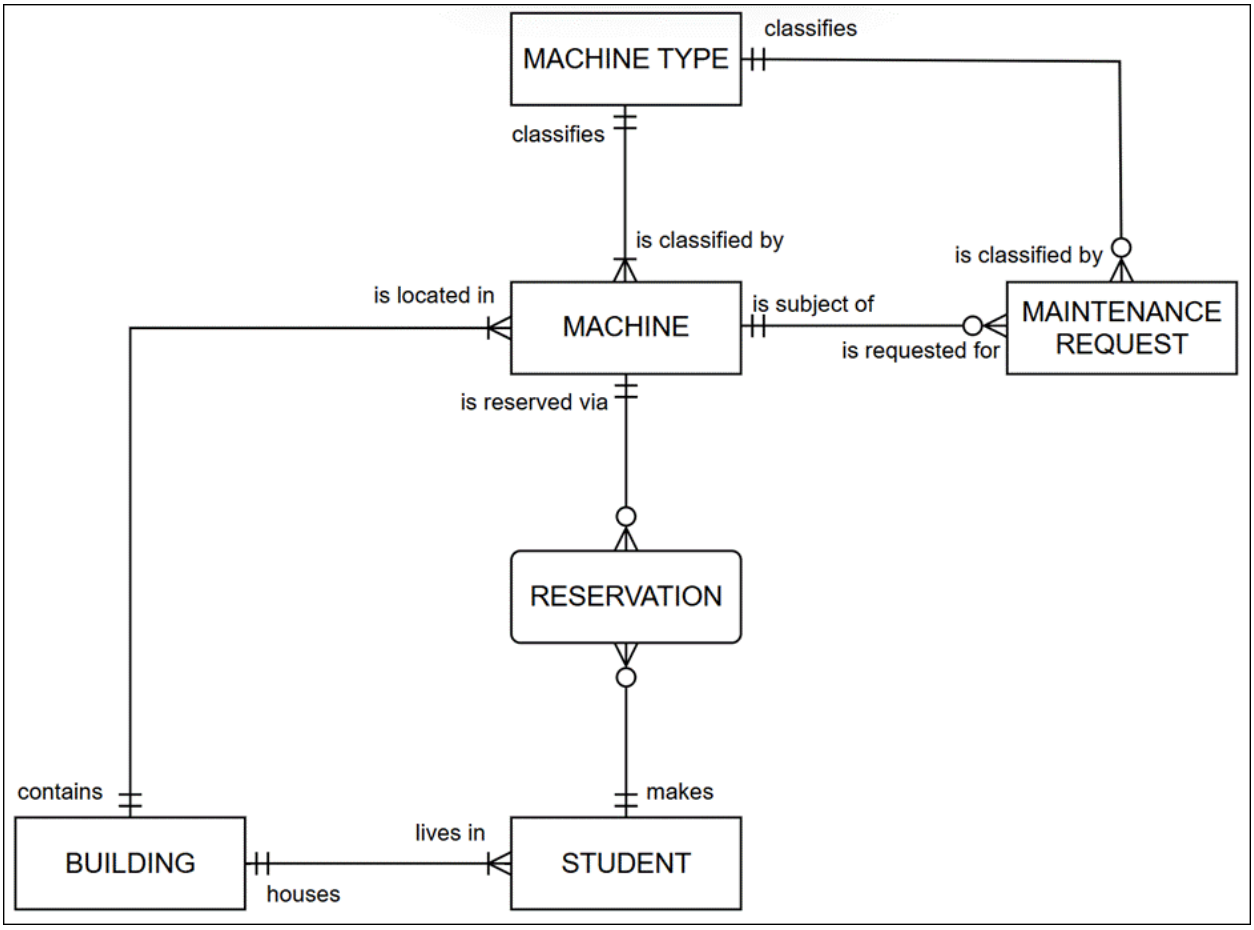
Living conditions are one of the most prominent factors in a prospective college student's decision on where to commit. The food in the dining halls, residence hall amenities, bathroom

accessibility, or even the closet size could be make or break factors in this life-changing decision for a student and their family. On this note, laundry room issues are one of the most universal challenges for college students that seem to be overlooked. Introducing prospective students to *SpinReserve* could alleviate potential concerns. Many incoming college students have never done their own laundry before, so ensuring they will not encounter problems and get into conflict with fellow students over laundry may play even a small factor in them choosing one school over another.

Additionally, it makes things much less complicated for the administration that must oversee laundry room debacles year after year, from entire loads having to be put in the lost and found, RAs getting involved in mediating laundry-related arguments, frequent machine damage due to lack of accountability for students to treat them properly, etc. If they know a machine broke on a certain date, and they know it was from a student's deliberate and wanton misuse of the machine, then they can check who the most recent students to use that exact machine through our database. There have been instances at Binghamton University in recent years where entire residence halls closed their laundry rooms for a period of time because a select few students refused to treat the machines properly, forcing the entire building to suffer from their misdeeds. Overall, we may be more intensive than our competitor, and therefore will likely be more expensive to implement, but the value we add to universities will more than make up for our cost. Overall, we estimate that using *SpinReserve* over a competitor, or no system at all, could lead to several hours per week being saved for students, lower maintenance and upkeep costs on the part of the university, and unquantifiable amounts of water being saved through minimizing waste, broken machines, underutilizing machines, etc.

Database Design

Enterprise Data Model (Fig. 2)



Entity & Attribute Definitions

Our *SpinReserve* database, depicted in the enterprise data model above, involves six core entities: STUDENT, MACHINE, MACHINE TYPE, RESERVATION, BUILDING, and MAINTENANCE REQUEST. These entities are supported by clearly defined attributes, relationships, and constraints. Below are entity type descriptions, followed by business rules and general assumptions used for our system.

Each instance of STUDENT is uniquely identified by "student_id." STUDENT includes all students at a given university that are presently enrolled in at least one course at the university and reside in an on-campus residence hall. A STUDENT instance is created for each student that lives in a residence hall each semester, and is deleted at the end of each semester, or if the student is expelled, drops out, or involved in any other action that would result in their permanent removal from the institution. STUDENT's attributes include:

- "student_id" is the unique student ID assigned to each student when they begin at a university. The structure will differ from school to school; using Binghamton as an

example, it is a character-type attribute that allows nine characters; each "student_id" will consist of a "B" followed by eight digits. There are no aliases for this attribute within the database, yet other documentation may refer to "student_id" differently. At Binghamton, it may be referred to as B-ID or Binghamton ID, for example. This column will be sourced from university/registrar documentation. It is required, immutable, single-valued, and not derived.

- "student_name" includes the full names of each student in the database, as they are represented in university documentation. This is important for identifying students by name and not just their ID number. It is a character-type attribute that allows up to thirty characters. It is required, immutable, single-valued, not derived, and has no aliases.
- "student_email" includes the university-given email of the student record. Like "student_id," its structure may differ from school to school. At Binghamton, it will be a character-type attribute with up to 24 characters, including the student's first initial of their first name, followed by the first six digits of their last name, a number to differentiate them from other student that might have the same first seven characters, and ending with '@binghamton.edu'. There are no aliases within the database, but on other Binghamton documentation it may be referred to as Binghamton e-mail or B-mail. It is sourced from official university documentation, is immutable, single-valued, required, and not derived.
- Finally, "building_id" is a foreign key assigned to each student that denotes what residence hall they live in. This allows *SpinReserve* to know which building to make the washer and dryer reservations in. It is a character-type attribute that allows up to two characters. It is required, has no aliases, may change (if a student moves mid-semester), is single-valued, and not derived.

A MACHINE instance is a washer or dryer unit used in a dormitory building that is available for students to reserve using *SpinReserve*. "machine_id" is the unique identifier for MACHINE. Every washer and dryer unit available for student use in a laundry room of a university dormitory is included. Washer and dryer units used for faculty/administrative purposes are not included. An instance of MACHINE is created when a new washer or dryer is installed in a dormitory building for student personal use and is deleted when a washer or dryer is permanently retired. MACHINE has the following attributes and definitions:

- "machine_id," as previously mentioned, is the unique identifier for each machine. It is important for assigning reservations and maintenance requests to the proper machine. It is a character-type attribute that allows up to three characters. It is immutable, single-valued, has no aliases, and is not derived.
- "building_id," as previously mentioned in the STUDENT entity type, serves the same function and has the same properties here. It is a foreign key that links the MACHINE entity to the BUILDING entity and denotes what building each machine is in. It is changeable, if a machine happens to be moved, and is required, single-valued, and not derived.
- "machine_type" is a foreign key that links the BUILDING entity to the MACHINE_TYPE entity. This denotes whether an instance of a machine is a washer or dryer, using a 1 or 2 to easily distinguish them. It is a character-type attribute that only allows one character. It is required, single-valued, immutable, and not derived.
- "installation_date" is a date-type attribute that lists the day each machine was first installed at the university. This is immutable, required, single-valued, and not derived.

MACHINE_TYPE is an entity type used to store the strings “washer” and “dryer.” “type_id” is the unique identifier that differentiates the binary options, 1 for “washer” and 2 for “dryer.” Attributes include:

- “type_id” is the primary key of the entity type. It is a character-type attribute with up to one character allowed. It has an alias “machine_type” in other tables in the database. It is required, immutable, not derived, and single-valued.
- “type_name” is the label for what 1 and 2 represent. This allows those unfamiliar with the database to easily learn how to eyeball what each machine is. It is immutable, single-valued, not derived, required, and has no aliases.

RESERVATION is an associative entity that bridges the many-to-many relationship between the STUDENT and MACHINE entities. Unique entity instances are differentiated by “reservation_id.” The entity is reset every semester, same as with the STUDENT entity type and all existing reservations records are deleted for optimal storage. Two reservation instances are created when a student schedules a time to do laundry, both for a washer and a dryer. Attributes include:

- “reservation_id” is the primary key for the RESERVATION entity. It is a character-type entity that takes up to five characters. It uniquely identifies each reservation. It has no aliases, is required, is single-valued, and not derived.
- “time_id” is a character-type attribute that takes up to five characters. It is used to connect the separate washer and dryer reservations that are made when students select their 2.25 hour time slot. For example, reservation_ids 11 (washer) and 12 (dryer) are connected through time_id 6. “time_id” is immutable, required, single_valued, not derived, and has no alias.
- “student_id” is a foreign key that links each reservation to the student that makes it. It has all of the same properties as the “student_id” primary key.
- “machine_id” is a foreign key that links each reservation to the machine *SpinReserve* assigns it to. It has all of the same properties as the “building_id” primary key.
- “start_time” denotes what time each reservation begins, shown as a date-type attribute in military time. It is single-valued, required, has no aliases, and is not derived.
- “end_time” denotes what time each reservation ends, shown as a date-type attribute in military time. It is single-valued, required, has no aliases, and is not derived.
- “reservation_date” denotes the date at the start of each reservation. For example, if the reservation start time is 11:30 pm on February 1st, the value for “reservation_date” will be 2025-02-01, even though most of the reservation happens after midnight. “reservation_date” is a single-valued, un-derived, required value with no alias.
- “reservation_status” is a character-type attribute that holds up to nine characters. It is a derived attribute based on the current time in relation to each entity instance. If a future reservation is standing, it says “Reserved,” if canceled it says “Canceled,” if the student does not utilize their reservation it says “Expired” and finally if the reservation is completed as normal it says “Completed.” It is mutable based on the aforementioned conditions, is required, single-valued, and has no aliases.

The BUILDING entity type describes the residence halls on campus that students live and do their laundry in. Each building is uniquely identified by “building_id.” A building is created when a new dorm is constructed and opened for student living, and a building instance is deleted when a dorm is decommissioned, closed, or destroyed for any reason. Attributes include:

- “building_id” is the primary key that uniquely identifies each building. It is a character-type attribute that takes up to two characters. It is required, has no aliases, is single-valued, and is not derived.
- “building_name” is the name of each building, sourced from a list of residence halls at each university that employs *SpinReserve*. It is a character-type attribute that takes up to twelve characters. It cannot be changed, is required, single-valued, has no aliases, and is not derived.
- “washer_count” is an integer-type attribute that represents the total number of washing machines in each building. It can change if the university decides to add or remove a washing machine. It is required, has no aliases, is not derived, and is single-valued.
- “dryer_count” is an integer-type attribute that represents the total number of dryers in each building. It can change if the university decides to add or remove a dryer. It is required, has no aliases, is not derived, and is single-valued.
- “student_count” is an integer-type attribute that represents the total number of students in each building for that semester. It is updated only at the beginning of each semester, as there is no need to make it recalculate accurate student counts throughout the semester as a derived variable. It is required, has no aliases, is not derived, and is single-valued.

The MAINTENANCE_REQUEST entity type lists issues with washer or dryer units that are submitted by students for faculty to fix. Each request is uniquely identified by a “request_id.” A request is created when a student enters the app and submits a request, and a requests/repair entries are not deleted unless the associated machine is retired. Attributes include:

- “request_id” is the primary key the uniquely identifies each instance of MAINTENANCE_REQUEST. It is a character-type attribute that allows up to four characters. It is required, has no aliases, is single-valued, not derived, and immutable.
- “machine_id” is a foreign key the links this table with the MACHINE table. It has all of the same properties as every other instance of “machine_id.”
- “machine_type” is a foreign key that lists each maintenance request as being for a washer or dryer unit, linking each record back to “type_id” in the MACHINE_TYPE table. It has all of the same properties as “machine_type” in the MACHINE table.
- “request_date” is a date-type attribute that shows the date that a student submitted the maintenance request. It is immutable, required, single-valued, not derived, and has no aliases.
- “issue_description” is a character-type attribute allowing up to fifty characters. It is a general description of what the perceived issue is, selected from a list of pre-selected options (“Bad odor,” “Excessive noise,” “Leaking,” “No power,” “Not draining,” “Takes too long to dry”). It is required, immutable, single-valued, not derived, and has no aliases.
- “repair_date” is the date that a repairman officially declared the machine as fixed and ready to be put back in use. It is a date-type attribute that is immutable, required, single-valued, not derived, and has no aliases.
- “repair_description” is a character-type attribute allowing up to fifty characters. It is a general description of the repair that was done, where the repairman chooses from a preselected list of repairs (“Adjusted alignment”, “Cleared blockage”, “Inspected for damage”, “Lubricated moving parts”, “Replaced faulty part”, “Reset power supply”). It is required, immutable, single-valued, not derived, and has no aliases.
- “repair_status” is a character-type attribute with up to 20 characters, describing whether the maintenance request has been fulfilled, showing “Closed”, or is still open, showing

either “Repair in Progress” if steps have been taken to fix the machine, or “Received”, if the request has been received but no action has been taken.

Business Rules & Assumptions

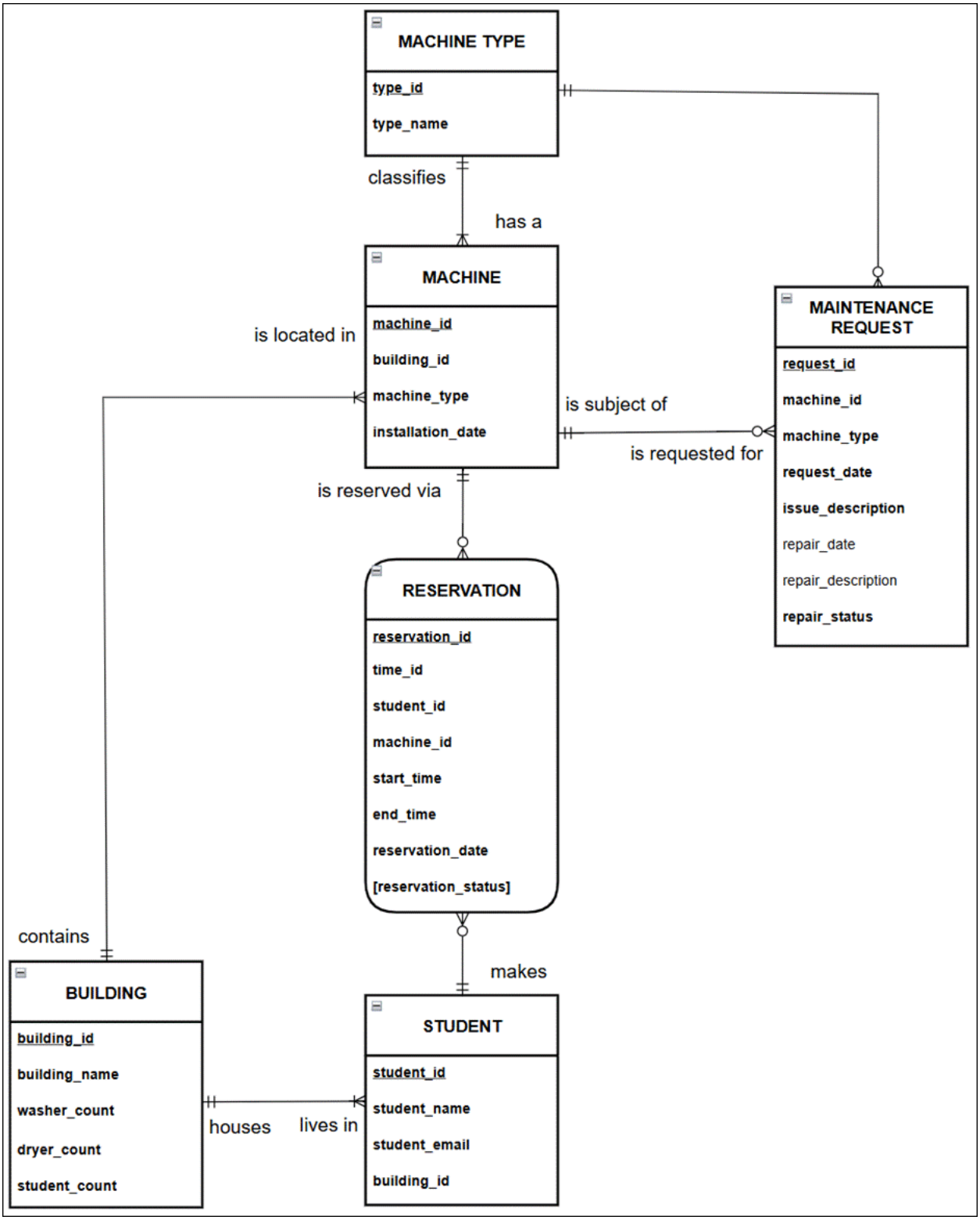
Now that the entities and attributes have been defined, we will get into the business rules and assumptions. As is evident in the enterprise data model above, below are the relationships between each entity type:

- A student can have zero or many reservations. A student can only live in exactly one building.
- A machine is located in exactly one building. A machine is classified by exactly one machine type. A machine is the subject of zero or many maintenance requests. A machine is reserved via zero or many reservations.
- A machine type classifies many machines and maintenance requests.
- A reservation is for exactly one machine and exactly one student.
- A building houses many students and contains many machines.
- A maintenance request is requested for exactly one machine and is classified by exactly one machine type.

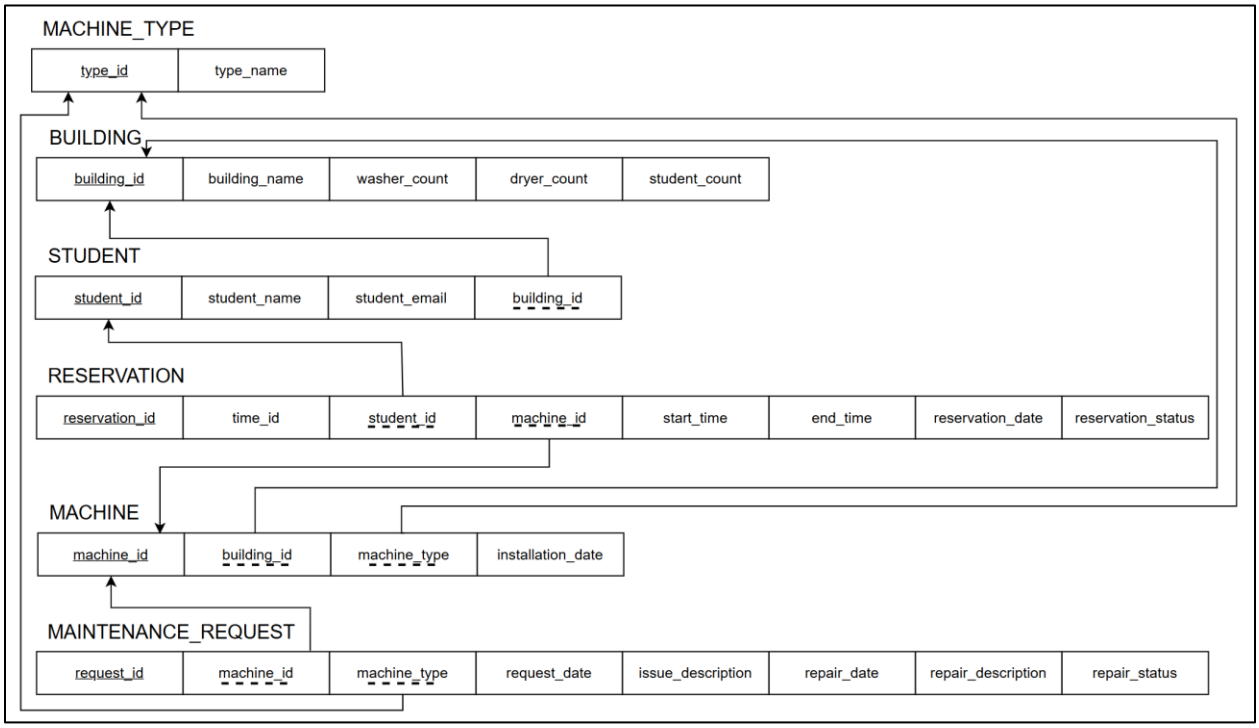
Additionally, there are several other business rules and assumptions made, listed below:

- A student may have up to three overlapping 2.25-hour blocks reserved simultaneously.
- A student may not have more than three 2.25-hour blocks reserved simultaneously within one calendar week. Students cannot schedule more than two time blocks simultaneously that are more than a month away.
- A student may only reserve machines in the building they live in.

Entity-Relationship Diagram (Fig. 3)



Relational Schema (Fig. 4)



E-R Diagram Innovativeness Demonstration

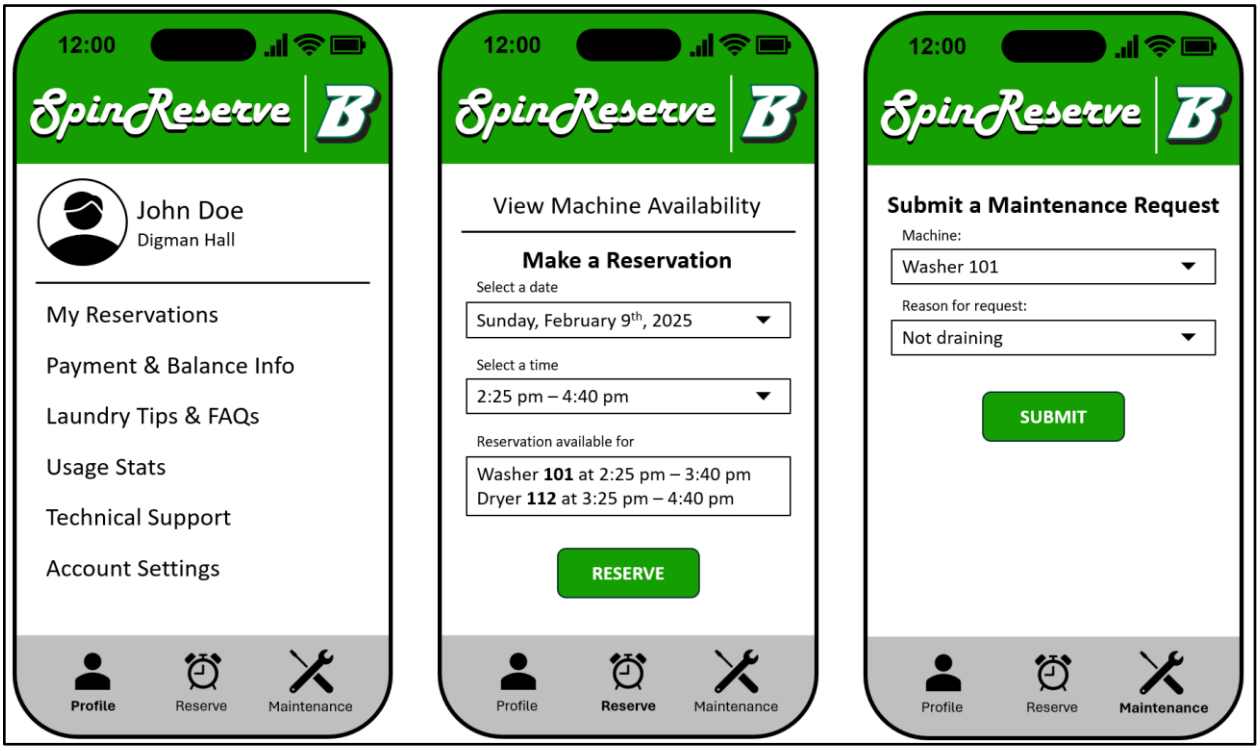
Our E-R diagram demonstrates its innovativeness in ways that show its efficiency and scalability. One of the most innovative aspects of our database design is the inclusion of the MACHINE_TYPE entity, which acts as an essential storage-saver that reduces redundant strings taking up storage, and helps database administrators more efficiently skim through records without having to register full words for the machine type. Another innovative feature is the "time_id" attribute in the RESERVATION entity, which saves us from needing to make attributes in the reservation table multivalued and, in turn, attach a weak entity to the table. It also makes it easier to link machines together that were part of the same reservation, instead of going through and having to figure out based on the student ID, usage times, and dates of each reservation. Additionally, our MAINTENANCE_REQUEST entity having limited issue and repair descriptions might seem limiting, but allows for grouping and filtering by comprehensive issue and repair categories. This feature lets the repairmen and administration easily see what the most common problems are and the most common solutions, so they are more adequately prepared in terms of what to expect and what extra parts to have at their disposal.

Functionality

App Description

The *SpinReserve* app offers a streamlined and intuitive user interface that allows students to efficiently manage their laundry usage within their assigned dormitory. The app features three main sections, “Profile,” “Reserve,” and “Maintenance,” each accessible through a navigation bar at the bottom of the screen. The “Profile” tab lets users review their current and upcoming reservations, payment information and account balance (if the university charges for laundry), laundry tips, usage statistics (for gamification), technical support, and account settings. On the “Reserve” tab, students can view real-time availability of washers and dryers in their building, with clear circular indicators showing time remaining or availability status. The “Maintenance” tab allows students to quickly report machine issues. These core functions work together to improve fairness, accountability, and efficiency in on-campus laundry management, offering a more robust and practical alternative to existing tools like *LaundryView* or other current laundry services.

Mock Screens (Fig. 5)



Implementation

Database Creation and Value Insertion

Each table was filled with as many records as we felt necessary to provide a realistic and comprehensive view of what our application could look like in practice. First, we had to create the BUILDING entity, as this was one that is often used as a foreign key reference but has no foreign keys within it. We listed the number of washers, dryers, and students currently in each building as of the spring 2025 semester. We create twenty-two building records, representing the twenty-two residence halls that make up the five main living communities at Binghamton University.

building_id	building_name	washer_count	dryer_count	student_count
1	Bingham	5	6	132
2	Broome	11	12	276
3	Cascade	6	5	242
4	Cayuga	8	10	360
5	Cleveland	8	9	408
6	Delaware	6	7	156
7	Digman	10	11	252
8	Endicott	10	12	484
9	Hughes	6	4	120
10	Hunter	8	6	252
11	Johnson	12	11	368
12	Lehman	6	8	196
13	Marcy	8	7	180
14	Mohawk	11	10	378
15	O'Connor	11	12	552
16	Oneida	6	4	120
17	Onondaga	11	11	484
18	Rafuse	4	6	180
19	Roosevelt	10	10	360
20	Seneca	5	6	242
21	Smith	12	11	322
22	Windham	7	7	280

Next, for the STUDENT entity, we created records of seventy-seven unique students.

student_id	student_name	student_email	building_id
B00620691	Aashima Sharma	asharma24@binghamton.edu	6
B00052008	Adam Chen	achen230@binghamton.edu	12
B00662788	Alec Litvin	alitvin1@binghamton.edu	13
B00597135	Alexander Calderon	acalde14@binghamton.edu	10
B00175708	Alexander Peyser	apeyser1@binghamton.edu	3
B00257891	Alexandra Schulz	aschulz2@binghamton.edu	3
B00223806	Allison Lee	alee935@binghamton.edu	8
B00103489	Allison Park	apark44@binghamton.edu	1
B00368666	Alvin Lin	alin208@binghamton.edu	15
B00772454	Amy Wang	awang145@binghamton.edu	8
B00070320	Anastasia Glenis	aglenis1@binghamton.edu	18
B00965511	Angelina Salvacruz	asalvac1@binghamton.edu	15
B00393809	Anh Ngo	ango2@binghamton.edu	2
B00137584	Benjamin Greenbaum	bgreenb6@binghamton.edu	2
B00431992	Benjamin Sommers	bsommer2@binghamton.edu	5
B00464518	Brennen Riley	briley5@binghamton.edu	18
B00264777	Caila Abou-Saab	cabousa1@binghamton.edu	9
B00709285	Catherine Heitner	cheitne2@binghamton.edu	13
B00206826	Claire Murphy	cmurph22@binghamton.edu	12
B00621717	Damon Lawrence	dlawren7@binghamton.edu	8
B00387275	Daniel Miller	dmille54@binghamton.edu	15
B00013605	Daniel Mygan	dmygan1@binghamton.edu	16
B00016944	Declan Davis	ddavis36@binghamton.edu	20
B00126012	Delaney Cotter	dcotter2@binghamton.edu	1
B00514437	Dominick Garofola	dgarofo1@binghamton.edu	12
B00791485	Dylan Saltzman	dsaltzman@binghamton.edu	1
B00567723	Evan Lechowicz	elechow1@binghamton.edu	3
B00107797	Gabriella DelPozzo	gdelpoz1@binghamton.edu	13
B00635188	Giovanni Losquadro	glosqua1@binghamton.edu	22
B00834253	Grace Davis	gdavis5@binghamton.edu	10
B00382730	Isabella Florentino	ifloren3@binghamton.edu	6
B00801893	Israel Richardson	irichar1@binghamton.edu	11
B00473525	Jacob Tullo	jtullo2@binghamton.edu	15
B00966596	Jacob Viel	jviel1@binghamton.edu	15
B00510613	Jake Zemsky	jzemsky1@binghamton.edu	17

Next, we have the MACHINE_TYPE entity type, which is simply a key to identify whether a machine in the MACHINE entity type is a washer or dryer. We felt that since these would be repetitive values in the MACHINE entity type, it would be more computationally efficient to store them as 1s and 2s instead. Without this small table, there would be hundreds of five and six letter strings in the MACHINE table.

type_id	type_name
1	Washer
2	Dryer

We then created a MACHINE entity type with 366 records, consisting of a mixture of washers and dryers. This amount of machines is what we believe to be a realistic representation of Binghamton University's washer and dryer count, at least for residence halls in the main five communities.

machine_id	building_id	machine_type	installation_date
213	14	1	2000-01-05
109	7	2	2000-01-17
185	12	1	2000-01-17
74	5	2	2000-02-01
73	5	2	2000-02-09
128	8	2	2000-03-06
23	2	2	2000-04-13
18	2	1	2000-05-13
178	11	2	2000-05-15
266	16	2	2000-06-01
134	8	2	2000-06-22
259	16	1	2000-06-24
51	4	1	2000-07-01
214	14	1	2000-08-02
351	21	2	2000-08-21
305	19	1	2000-09-01
268	17	1	2000-09-28
175	11	2	2000-10-14
156	10	2	2000-12-01
264	16	2	2001-01-17
190	12	2	2001-02-24
163	11	1	2001-03-04
337	21	1	2001-03-08
331	21	1	2001-04-06
91	6	2	2001-05-22
25	2	2	2001-05-23
16	2	1	2001-07-01
365	22	2	2001-07-04
304	19	1	2001-07-11
92	6	2	2001-07-15
158	10	2	2001-07-29

Next, we created the RESERVATION associative entity with seventy-eight reservation records, which translates to thirty-nine distinct washer-dryer pairs of reservations. These reservations are representative of the first two weeks of the spring 2025 semester, spanning from January 15th through January 30th. All reports that involved referencing “today’s” date used February 1st as the present day.

reservation_id	time_id	student_id	machine_id	start_time	end_time	reservation_date	reservation_status
1	1	B00791485	3	18:00:00	19:15:00	2025-01-15	Completed
2	1	B00791485	11	19:00:00	20:15:00	2025-01-15	Completed
19	10	B00533867	95	14:05:00	15:20:00	2025-01-18	Completed
20	10	B00533867	104	15:05:00	16:20:00	2025-01-18	Completed
21	11	B00031932	239	14:00:00	15:15:00	2025-01-18	Canceled
22	11	B00031932	251	15:00:00	16:15:00	2025-01-19	Canceled
23	12	B00687482	22	13:00:00	14:15:00	2025-01-19	Completed
24	12	B00687482	29	14:00:00	15:15:00	2025-01-19	Completed
25	13	B00411891	189	03:10:00	04:25:00	2025-01-19	Completed
26	13	B00411891	196	04:10:00	05:25:00	2025-01-19	Completed
27	14	B00706143	222	00:15:00	01:30:00	2025-01-19	Completed
28	14	B00706143	233	01:15:00	02:30:00	2025-01-19	Completed
29	15	B00460180	353	16:05:00	17:20:00	2025-01-20	Completed
30	15	B00460180	360	17:05:00	18:20:00	2025-01-20	Completed
31	16	B00533867	101	10:10:00	11:25:00	2025-01-21	Completed
32	16	B00533867	110	11:10:00	12:25:00	2025-01-21	Completed
33	17	B00801893	164	02:00:00	03:15:00	2025-01-21	Canceled
34	17	B00801893	176	03:00:00	04:15:00	2025-01-21	Canceled
35	18	B00031932	243	06:10:00	07:25:00	2025-01-21	Completed
36	18	B00031932	255	07:10:00	08:25:00	2025-01-21	Completed
37	19	B00013605	258	08:10:00	09:25:00	2025-01-21	Completed
38	19	B00013605	264	09:10:00	10:25:00	2025-01-21	Completed
3	2	B00922759	38	16:00:00	17:15:00	2025-01-15	Completed
4	2	B00922759	43	17:00:00	18:15:00	2025-01-15	Completed
39	20	B00406057	320	06:10:00	07:25:00	2025-01-22	Completed
40	20	B00406057	327	07:10:00	08:25:00	2025-01-22	Completed
41	21	B00801893	172	20:15:00	21:30:00	2025-01-22	Canceled
42	21	B00801893	173	21:15:00	22:30:00	2025-01-22	Canceled
43	22	B00103489	2	01:05:00	02:20:00	2025-01-22	Completed
44	22	B00103489	6	02:05:00	03:20:00	2025-01-22	Completed
45	23	B00342857	46	12:05:00	13:20:00	2025-01-23	Completed

Lastly, we created a MAINTENANCE_REQUEST entity type, listing twenty-three maintenance request records.

request_id	machine_id	machine_type	request_date	issue_description	repair_date	repair_description	repair_status
21	339	1	2025-01-16	Leaking	NULL	NULL	Received
22	164	1	2025-01-21	Not draining	NULL	NULL	Repair in Pro...
23	156	2	2025-02-07	Takes too long to dry	NULL	NULL	Received
1	96	1	2020-04-21	Leaking	2020-04-25	Adjusted alignment	Closed
15	288	2	2023-03-17	Excessive noise	2023-03-26	Adjusted alignment	Closed
17	137	1	2023-10-18	Not spinning	2023-10-19	Adjusted alignment	Closed
19	281	2	2024-07-05	Takes too long to dry	2024-07-31	Adjusted alignment	Closed
9	10	2	2021-10-12	Takes too long to dry	2021-11-01	Adjusted alignment	Closed
2	150	1	2020-05-14	Not draining	2020-05-24	Cleared blockage	Closed
3	252	2	2020-06-27	No power	2020-07-15	Cleared blockage	Closed
5	259	1	2021-03-04	Not draining	2021-03-09	Cleared blockage	Closed
11	328	2	2022-07-25	Takes too long to dry	2022-08-25	Inspected for damage	Closed
18	4	1	2024-06-02	Bad odor	2024-06-05	Inspected for damage	Closed
20	202	1	2024-11-03	No power	2024-11-30	Inspected for damage	Closed
4	146	2	2021-01-18	Excessive noise	2021-01-21	Inspected for damage	Closed
6	95	1	2021-04-13	Not draining	2021-04-15	Inspected for damage	Closed
10	66	1	2022-04-27	Leaking	2022-05-10	Lubricated moving parts	Closed
14	298	2	2023-02-16	Excessive noise	2023-03-10	Replaced faulty part	Closed
12	94	1	2022-10-07	Leaking	2022-10-22	Reset power supply	Closed
13	156	2	2022-11-14	Takes too long to dry	2022-11-15	Reset power supply	Closed
16	6	2	2023-04-27	Excessive noise	2023-04-27	Reset power supply	Closed
7	267	1	2021-04-28	Not draining	2021-05-23	Reset power supply	Closed
8	70	1	2021-07-07	No power	2021-07-18	Reset power supply	Closed

Report Generation

For the first report we wrote a query to show how many machines were installed more than 10 years ago that have never been serviced. This information is helpful because it could indicate which machines are more likely to break down soon, need to be replaced, or should receive a check-up. This query uses order by and joins query types.

machine_id	installation_date	request_id	request_date	repair_date
213	2000-01-05	NULL	NULL	NULL
109	2000-01-17	NULL	NULL	NULL
185	2000-01-17	NULL	NULL	NULL
74	2000-02-01	NULL	NULL	NULL
73	2000-02-09	NULL	NULL	NULL
128	2000-03-06	NULL	NULL	NULL
23	2000-04-13	NULL	NULL	NULL
18	2000-05-13	NULL	NULL	NULL
178	2000-05-15	NULL	NULL	NULL
266	2000-06-01	NULL	NULL	NULL
134	2000-06-22	NULL	NULL	NULL
259	2000-06-24	5	2021-03-04	2021-03-09
51	2000-07-01	NULL	NULL	NULL
214	2000-08-02	NULL	NULL	NULL
351	2000-08-21	NULL	NULL	NULL
305	2000-09-01	NULL	NULL	NULL
268	2000-09-28	NULL	NULL	NULL
175	2000-10-14	NULL	NULL	NULL
156	2000-12-01	13	2022-11-14	2022-11-15
156	2000-12-01	23	2025-02-07	NULL
264	2001-01-17	NULL	NULL	NULL
190	2001-02-24	NULL	NULL	NULL
163	2001-03-04	NULL	NULL	NULL
337	2001-03-08	NULL	NULL	NULL
331	2001-04-06	NULL	NULL	NULL
91	2001-05-22	NULL	NULL	NULL
25	2001-05-23	NULL	NULL	NULL
16	2001-07-01	NULL	NULL	NULL
365	2001-07-04	NULL	NULL	NULL
304	2001-07-11	NULL	NULL	NULL
92	2001-07-15	NULL	NULL	NULL
158	2001-07-29	NULL	NULL	NULL
5	2001-08-03	NULL	NULL	NULL
39	2001-08-18	NULL	NULL	NULL
24	2001-11-02	NULL	NULL	NULL

Our second report shows how many laundry loads have been done in each building so far in the current semester. This is important for those in charge of the laundry machines to see overall usage from the students. This query uses order by, group by, and functions query types.

building_id	laundry_sessions
7	4
1	3
11	3
14	3
15	3
3	3
8	3
18	2
19	2
20	2
22	2
4	2
10	1
12	1
13	1
16	1
2	1
21	1
6	1
9	1

Our third report shows how many machines currently have unfulfilled maintenance requests that were submitted over one week ago as of February 1st. This is useful for the maintenance workers to see which maintenance requests are still open that have been unfulfilled for a significant amount of time and are of higher priority. We use compound condition query types.

request_id	machine_id	machine_type	request_date	issue_description	repair_date	repair_description	repair_status
21	339	1	2025-01-16	Leaking	NULL	NULL	Received
22	164	1	2025-01-21	Not draining	NULL	NULL	Repair in Progress

The fourth report displays students that have not done any laundry in the current semester. This will be extremely useful for the university to proactively identify students that may need a wellness check, especially if this number remains low throughout the semester. This query uses functions, group by, and joins query types.

student_name	student_id	building_id	COUNT(DISTINCT(time_id))
Declan Davis	B00016944	20	0
Adam Chen	B00052008	12	0
Tala Al Kuisi	B00069758	10	0
Sangji Park	B00079856	9	0
Gabriella DelPozzo	B00107797	13	0
Benjamin Greenbaum	B00137584	2	0
Alexander Peyser	B00175708	3	0
Claire Murphy	B00206826	12	0
Alexandra Schulz	B00257891	3	0
Caila Abou-Saab	B00264777	9	0
Lidjie Civil	B00295160	20	0
Nicholas Kingston	B00322082	15	0
Noah LaBarge	B00331264	17	0
Alvin Lin	B00368666	15	0
Isabella Florentino	B00382730	6	0
Daniel Miller	B00387275	15	0
Anh Ngo	B00393809	2	0
Benjamin Sommers	B00431992	5	0
Jacob Tullo	B00473525	15	0
Lindsey Garthe	B00501649	5	0
Jake Zemsky	B00510613	17	0
Dominick Garofola	B00514437	12	0
Rainar Anderson	B00516656	6	0
Nnennaya Okoro	B00558432	12	0
Jenny Bao	B00559676	15	0
Matthew Sabony	B00576960	20	0
Vincent Santoiemma	B00577072	3	0
May Dolphin	B00595936	17	0
Alexander Calderon	B00597135	10	0
Vikasini Nandhakumar	B00611114	10	0
Aashima Sharma	B00620691	6	0
Damon Lawrence	B00621717	8	0
Giovanni Losquadro	B00635188	22	0
Ryan Sidi	B00657360	15	0
Nathaniel Stuber	B00700261	20	0

The fifth report shows machines where students canceled their reservations and they have not been serviced in the last three years. This could lead to machines that have problems that cause a student to remove the reservation, yet they did not take the time to submit a maintenance request. We used compound conditions, subquery, and set operations query types. In this case there were no machines that fell under this criteria, but we still believe this to be a useful query to keep around as time goes on.

machine_id

The sixth report creates a new column in the MACHINE entity type called "maintenance_frequency," which counts the number of maintenance requests that have been submitted on each machine. This is useful because it allows for quick access to this statistic, which could be helpful in determining machines that may need to be replaced if there are enough maintenance requests on them. The query types used are updating data, group by, and functions.

machine_id	building_id	machine_type	installation_date	maintenance_frequency
156	10	2	2000-12-01	2
10	1	2	2007-10-17	1
137	9	1	2015-11-19	1
146	9	2	2003-07-14	1
150	10	1	2005-05-02	1
164	11	1	2015-03-16	1
202	13	1	2001-11-07	1
252	15	2	2005-03-10	1
259	16	1	2000-06-24	1
267	17	1	2010-01-24	1
281	17	2	2013-11-10	1
288	17	2	2002-03-01	1
298	18	2	2015-08-01	1
328	20	2	2009-11-23	1
339	21	1	2008-03-22	1
4	1	1	2008-07-28	1
6	1	2	2013-01-31	1
66	5	1	2011-04-18	1
70	5	1	2014-08-05	1
94	7	1	2013-06-29	1
95	7	1	2012-04-12	1
96	7	1	2003-01-07	1
1	1	1	2006-06-25	NULL
100	7	1	2002-05-27	NULL
101	7	1	2003-01-03	NULL
102	7	1	2007-09-26	NULL
103	7	1	2010-12-01	NULL
104	7	2	2014-06-06	NULL
105	7	2	2008-09-07	NULL
106	7	2	2005-10-26	NULL
107	7	2	2012-01-06	NULL
108	7	2	2010-06-07	NULL
109	7	2	2000-01-17	NULL
11	1	2	2010-09-18	NULL
110	7	2	2010-09-12	NULL

The seventh report identifies the most common issues for washers and dryers, which allows the university to learn which extra parts should be kept on hand more than others. We used functions, group by, and order by query types.

issue_description	issue_frequency
Not draining	5
Takes too long to dry	5
Leaking	4
Excessive noise	4
No power	3
Not spinning	1
Bad odor	1

Report eight lists students that do laundry at abnormal hours, based on a washer start time of at least 10 pm and before 6 am. This report will be useful for identifying students that may need wellness checks, or at least may need counseling in time management. We used compound conditions and order by query types.

student_id	student_name	start_time	end_time	reservation_status
B00223806	Allison Lee	00:05:00	01:20:00	Reserved
B00103489	Allison Park	01:05:00	02:20:00	Completed
B00706143	Katherine Buttiglione	00:15:00	01:30:00	Completed
B00406057	Matthew Desmond	05:15:00	06:30:00	Reserved
B00411891	Nahla Raya	03:10:00	04:25:00	Completed
B00342857	Robert Walker	01:15:00	02:30:00	Completed
B00960578	Tynan Murphy	00:10:00	01:25:00	Completed

The ninth report shows the most popular days of the week for students to do laundry. This is useful for scheduling repairs on machines, since the repairmen will know when the room is more empty and can do what is needed with as little interference or disruption as possible. We used functions, group by, and order by query types.

DAYNAME(reservation_date)	COUNT(*)
Wednesday	12
Tuesday	10
Thursday	20
Sunday	11
Saturday	9
Monday	8
Friday	8

Finally, the tenth report shows the ratio of washers to dryers, students to washers, students to dryers, and the number of loads done this semester in each residence hall. This could prove useful if the administration is thinking about moving around machines to accommodate disparate laundry usage in different buildings. We used functions and group by query types.

building_id	washer/dryer_ratio	student/washer_ratio	student/dryer_ratio	student_count	loads_done
1	0.8333	26	22	132	3
10	1.3333	32	42	252	1
11	1.0909	31	33	368	3
12	0.7500	33	25	196	1
13	1.1429	23	26	180	1
14	1.1000	34	38	378	3
15	0.9167	50	46	552	3
16	1.5000	20	30	120	1
18	0.6667	45	30	180	2
19	1.0000	36	36	360	2
2	0.9167	25	23	276	1
20	0.8333	48	40	242	2
21	1.0909	27	29	322	1
22	1.0000	40	40	280	2
3	1.2000	40	48	242	3
4	0.8000	45	36	360	2
6	0.8571	26	22	156	1
7	0.9091	25	23	252	4
8	0.8333	48	40	484	3
9	1.5000	20	30	120	1

Future Work

One major area of improvement for *SpinReserve* could be its gamification and social aspects. We have already established a "Usage Stats" page on the application, which would show a student's own laundry statistics (number of loads done each semester, average time spent doing laundry, etc.). If we built this out, *SpinReserve* could become not just an app for doing laundry but an entire social ecosystem within the school. Students could compare numbers, different universities could be pitted against each other based on aggregated statistics, etc. etc. We could even incorporate prizes for *SpinReserve* users with the highest scores, such as laundry credits at universities that charge for laundry of a shout-out on our social media.

We have also already introduced a "Laundry Tips & FAQs" page, which can be split into two distinct but equally important paths: an AI chatbot and a forum similar to YikYak or Reddit. The chatbot could be used for asking questions about laundry, such as what the best detergents are for different fabrics, how to get a stain out of a piece of clothing based on a picture uploaded to the chatbot, etc. The forum could be used for similar reasons, such as crowdsourcing opinions or starting discussions on laundry-related topics, but also for farming user engagement to generate revenue from unobtrusive ads. Sony, for example, does weekly social media contests where they have PlayStation users take in-game photos and post the most creative ones on their social media with a shout-out. We could take a similar approach, where we ask *SpinReserve* users to submit their most creative t-shirt folding technique for a chance to win a shout-out or free laundry credit. These features would serve to significantly increase user engagement, leading to increased revenue and, if done correctly, immense goodwill and relationships between us and our customers.

Appendix

Entity Creation

CREATE DATABASE FinalDeliverable;

USE FinalDeliverable;

I. BUILDING

CREATE TABLE building

(building_id CHAR(2) PRIMARY KEY,

building_name CHAR(12) NOT NULL,

washer_count INT(2) NOT NULL,

dryer_count INT(2) NOT NULL,

student_count INT(3) NOT NULL

);

II. STUDENT

CREATE TABLE student

(student_id CHAR(9) PRIMARY KEY,

student_name CHAR(30) NOT NULL,

student_email CHAR(24) NOT NULL,

building_id CHAR(2) NOT NULL,

CONSTRAINT FK_building_id_STUDENT FOREIGN KEY (building_id) REFERENCES BUILDING(building_id)

);

III. MACHINE_TYPE

CREATE TABLE machine_type

(type_id CHAR (1) PRIMARY KEY,

type_name CHAR (6) NOT NULL

);

IV. MACHINE

CREATE TABLE machine

(machine_id CHAR(3) PRIMARY KEY,

building_id CHAR(2) NOT NULL,

machine_type CHAR(1) NOT NULL,

installation_date DATE NOT NULL,

CONSTRAINT FK_building_id_MACHINE FOREIGN KEY (building_id) REFERENCES BUILDING(building_id),

CONSTRAINT FK_machine_type_MACHINE FOREIGN KEY (machine_type) REFERENCES MACHINE_TYPE(type_id)

);

V. RESERVATION

CREATE TABLE reservation

(reservation_id CHAR(5) PRIMARY KEY,

time_id CHAR(5) NOT NULL,

student_id CHAR(9) NOT NULL,

machine_id CHAR(3) NOT NULL,

start_time TIME NOT NULL,

end_time TIME NOT NULL,

reservation_date DATE NOT NULL,

reservation_status CHAR(9) NOT NULL,

CONSTRAINT FK_student_id_RESERVATION FOREIGN KEY (student_id) REFERENCES STUDENT(student_id),

CONSTRAINT FK_machine_id_RESERVATION FOREIGN KEY (machine_id) REFERENCES MACHINE(machine_id)

);

VI. MAINTENANCE_REQUEST

CREATE TABLE maintenance_request

(request_id CHAR(4) PRIMARY KEY,

machine_id CHAR(3) NOT NULL,

machine_type CHAR(1) NOT NULL,

request_date DATE NOT NULL,

issue_description CHAR(50) NOT NULL,

repair_date DATE,

repair_description CHAR(50),

repair_status CHAR(20),

CONSTRAINT FK_machine_id_MAINTENANCE FOREIGN KEY (machine_id)
REFERENCES MACHINE(machine_id),

CONSTRAINT FK_machine_type_id_MAINTENANCE FOREIGN KEY (machine_type)
REFERENCES MACHINE_TYPE(type_id)

);

Value Insertion

I. BUILDING

INSERT INTO BUILDING VALUES ('1','Bingham',5,6,132);

INSERT INTO BUILDING VALUES ('2','Broome',11,12,276);

INSERT INTO BUILDING VALUES ('3','Cascade',6,5,242);

INSERT INTO BUILDING VALUES ('4','Cayuga',8,10,360);

INSERT INTO BUILDING VALUES ('5','Cleveland',8,9,408);

INSERT INTO BUILDING VALUES ('6','Delaware',6,7,156);

INSERT INTO BUILDING VALUES ('7','Digman',10,11,252);

INSERT INTO BUILDING VALUES ('8','Endicott',10,12,484);

INSERT INTO BUILDING VALUES ('9','Hughes',6,4,120);

INSERT INTO BUILDING VALUES ('10','Hunter',8,6,252);

INSERT INTO BUILDING VALUES ('11','Johnson',12,11,368);

INSERT INTO BUILDING VALUES ('12','Lehman',6,8,196);

INSERT INTO BUILDING VALUES ('13','Marcy',8,7,180);

INSERT INTO BUILDING VALUES ('14','Mohawk',11,10,378);

```
INSERT INTO BUILDING VALUES ('15',"O'Connor",11,12,552);

INSERT INTO BUILDING VALUES ('16','Oneida',6,4,120);

INSERT INTO BUILDING VALUES ('17','Onondaga',11,11,484);

INSERT INTO BUILDING VALUES ('18','Rafuse',4,6,180);

INSERT INTO BUILDING VALUES ('19','Roosevelt',10,10,360);

INSERT INTO BUILDING VALUES ('20','Seneca',5,6,242);

INSERT INTO BUILDING VALUES ('21','Smith',12,11,322);

INSERT INTO BUILDING VALUES ('22','Windham',7,7,280);
```

II. STUDENT

```
INSERT INTO STUDENT VALUES ('B00103489','Allison
Park','apark44@binghamton.edu','1');

INSERT INTO STUDENT VALUES ('B00126012','Delaney
Cotter','dcotter2@binghamton.edu','1');

INSERT INTO STUDENT VALUES ('B00791485','Dylan
Saltzman','dsaltzman@binghamton.edu','1');

INSERT INTO STUDENT VALUES ('B00137584','Benjamin
Greenbaum','bgreenb6@binghamton.edu','2');

INSERT INTO STUDENT VALUES ('B00393809','Anh Ngo ','ango2@binghamton.edu','2');

INSERT INTO STUDENT VALUES ('B00687482','Michael Rau','mrau1@binghamton.edu','2');

INSERT INTO STUDENT VALUES ('B00175708','Alexander
Peyser','apeyser1@binghamton.edu','3');

INSERT INTO STUDENT VALUES ('B00257891','Alexandra
Schulz','aschulz2@binghamton.edu','3');

INSERT INTO STUDENT VALUES ('B00567723','Evan Lechowicz
','elechow1@binghamton.edu','3');

INSERT INTO STUDENT VALUES ('B00577072','Vincent
Santoiemma','vsantoi1@binghamton.edu','3');

INSERT INTO STUDENT VALUES ('B00922759','Shae Zaepfel
','szaepfe1@binghamton.edu','3');

INSERT INTO STUDENT VALUES ('B00342857','Robert
Walker','rwalke14@binghamton.edu','4');
```

```
INSERT INTO STUDENT VALUES ('B00722494','Sarah
Perez','sperez47@binghamton.edu','4');

INSERT INTO STUDENT VALUES ('B00431992','Benjamin
Sommers','bsommer2@binghamton.edu','5');

INSERT INTO STUDENT VALUES ('B00501649','Lindsey
Garthe','lgarthe1@binghamton.edu','5');

INSERT INTO STUDENT VALUES ('B00382730','Isabella Florentino
','ifloren3@binghamton.edu','6');

INSERT INTO STUDENT VALUES ('B00516656','Rainar
Anderson','randers5@binghamton.edu','6');

INSERT INTO STUDENT VALUES ('B00620691','Aashima
Sharma','asharma24@binghamton.edu','6');

INSERT INTO STUDENT VALUES ('B00960578','Tynan Murphy
','tmurph19@binghamton.edu','6');

INSERT INTO STUDENT VALUES ('B00533867','Joseph Rosenbaum
','jrosen90@binghamton.edu','7');

INSERT INTO STUDENT VALUES ('B00707428','John Kane','jkane9@binghamton.edu','7');

INSERT INTO STUDENT VALUES ('B00223806','Allison Lee','alee935@binghamton.edu','8');

INSERT INTO STUDENT VALUES ('B00485217','Srikanth
Parameswaran','sparames@binghamton.edu','8');

INSERT INTO STUDENT VALUES ('B00621717','Damon
Lawrence','dlawren7@binghamton.edu','8');

INSERT INTO STUDENT VALUES ('B00772454','Amy Wang
','awang145@binghamton.edu','8');

INSERT INTO STUDENT VALUES ('B00026456','Zachary
Cohan','zcohan1@binghamton.edu','9');

INSERT INTO STUDENT VALUES ('B00079856','Sangji Park
','spark289@binghamton.edu','9');

INSERT INTO STUDENT VALUES ('B00264777','Caila Abou-Saab
','cabousa1@binghamton.edu','9');

INSERT INTO STUDENT VALUES ('B00069758','Tala Al
Kuisi','talkuis1@binghamton.edu','10');

INSERT INTO STUDENT VALUES ('B00368805','Ryan
Rodriguez','rrodri68@binghamton.edu','10');
```

```
INSERT INTO STUDENT VALUES ('B00597135','Alexander
Calderon','acalde14@binghamton.edu','10');

INSERT INTO STUDENT VALUES ('B00611114','Vikasini
Nandhakumar','vnandha1@binghamton.edu','10');

INSERT INTO STUDENT VALUES ('B00834253','Grace
Davis','gdavis5@binghamton.edu','10');

INSERT INTO STUDENT VALUES ('B00632488','William
Capone','wcapone1@binghamton.edu','11');

INSERT INTO STUDENT VALUES ('B00801893','Israel Richardson
','irichar1@binghamton.edu','11');

INSERT INTO STUDENT VALUES ('B00052008','Adam
Chen','achen230@binghamton.edu','12');

INSERT INTO STUDENT VALUES ('B00206826','Claire
Murphy','cmurph22@binghamton.edu','12');

INSERT INTO STUDENT VALUES ('B00411891','Nahla Raya','nraya@binghamton.edu','12');

INSERT INTO STUDENT VALUES ('B00514437','Dominick
Garofola','dgarofo1@binghamton.edu','12');

INSERT INTO STUDENT VALUES ('B00558432','Nnennaya
Okoro','nokoro@binghamton.edu','12');

INSERT INTO STUDENT VALUES ('B00107797','Gabriella
DelPozzo','gdelpoz1@binghamton.edu','13');

INSERT INTO STUDENT VALUES ('B00662788','Alec
Litvin','alitvin1@binghamton.edu','13');

INSERT INTO STUDENT VALUES ('B00709285','Catherine
Heitner','cheitne2@binghamton.edu','13');

INSERT INTO STUDENT VALUES ('B00562616','Jasper Teng
','jteng5@binghamton.edu','14');

INSERT INTO STUDENT VALUES ('B00637066','Michael
Russo','mrusso16@binghamton.edu','14');

INSERT INTO STUDENT VALUES ('B00706143','Katherine
Buttiglione','kbuttig1@binghamton.edu','14');

INSERT INTO STUDENT VALUES ('B00031932','Valerie
Stracquadanio','vstracq1@binghamton.edu','15');
```

```
INSERT INTO STUDENT VALUES ('B00322082','Nicholas
Kingston','nkingst1@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00368666','Alvin Lin','alin208@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00387275','Daniel
Miller','dmille54@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00473525','Jacob Tullo','jtullo2@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00559676','Jenny Bao','jbao3@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00657360','Ryan Sidi','rsidi1@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00940454','Katherine Utin
','kutin1@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00965511','Angelina Salvacruz
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INSERT INTO STUDENT VALUES ('B00966596','Jacob Viel','jviel1@binghamton.edu','15');

INSERT INTO STUDENT VALUES ('B00013605','Daniel
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INSERT INTO STUDENT VALUES ('B00331264','Noah
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INSERT INTO STUDENT VALUES ('B00510613','Jake
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III. MACHINE_TYPE

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INSERT INTO MACHINE VALUES ('346','21','2','2015-07-05');

INSERT INTO MACHINE VALUES ('347','21','2','2002-07-24');

INSERT INTO MACHINE VALUES ('348','21','2','2003-11-22');

INSERT INTO MACHINE VALUES ('349','21','2','2004-01-07');

INSERT INTO MACHINE VALUES ('350','21','2','2006-09-15');

INSERT INTO MACHINE VALUES ('351','21','2','2000-08-21');

INSERT INTO MACHINE VALUES ('352','21','2','2004-08-30');

INSERT INTO MACHINE VALUES ('353','22','1','2004-12-29');

INSERT INTO MACHINE VALUES ('354','22','1','2006-02-16');

INSERT INTO MACHINE VALUES ('355','22','1','2012-05-12');

INSERT INTO MACHINE VALUES ('356','22','1','2004-01-13');

INSERT INTO MACHINE VALUES ('357','22','1','2014-11-19');

INSERT INTO MACHINE VALUES ('358','22','1','2015-06-22');

INSERT INTO MACHINE VALUES ('359','22','1','2015-10-23');

INSERT INTO MACHINE VALUES ('360','22','2','2015-11-25');

INSERT INTO MACHINE VALUES ('361','22','2','2011-03-09');

INSERT INTO MACHINE VALUES ('362','22','2','2005-07-22');

INSERT INTO MACHINE VALUES ('363','22','2','2013-03-15');

INSERT INTO MACHINE VALUES ('364','22','2','2006-04-08');

INSERT INTO MACHINE VALUES ('365','22','2','2001-07-04');

INSERT INTO MACHINE VALUES ('366','22','2','2013-02-22');

V. RESERVATION

INSERT INTO RESERVATION VALUES ('1','1','B00791485','3','18:00','19:15','2025-01-15','Completed');

INSERT INTO RESERVATION VALUES ('2','1','B00791485','11','19:00','20:15','2025-01-15','Completed');

INSERT INTO RESERVATION VALUES ('3','2','B00922759','38','16:00','17:15','2025-01-15','Completed');

INSERT INTO RESERVATION VALUES ('4','2','B00922759','43','17:00','18:15','2025-01-15','Completed');

INSERT INTO RESERVATION VALUES ('5','3','B00126012','4','16:15','17:30','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('6','3','B00126012','6','17:15','18:30','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('7','4','B00070320','290','16:10','17:25','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('8','4','B00070320','294','17:10','18:25','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('9','5','B00925281','339','11:00','12:15','2025-01-16','Canceled');

INSERT INTO RESERVATION VALUES ('10','5','B00925281','352','12:00','13:15','2025-01-16','Canceled');

INSERT INTO RESERVATION VALUES ('11','6','B00026456','142','21:00','22:15','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('12','6','B00026456','144','22:00','23:15','2025-01-16','Completed');

INSERT INTO RESERVATION VALUES ('13','7','B00368805','150','06:00','07:15','2025-01-17','Completed');

INSERT INTO RESERVATION VALUES ('14','7','B00368805','160','07:00','08:15','2025-01-17','Completed');

INSERT INTO RESERVATION VALUES ('15','8','B00965511','234','21:00','22:15','2025-01-17','Completed');

INSERT INTO RESERVATION VALUES ('16','8','B00965511','250','22:00','23:15','2025-01-17','Completed');

INSERT INTO RESERVATION VALUES ('17','9','B00922759','39','05:10','06:25','2025-01-18','Expired');

INSERT INTO RESERVATION VALUES ('18','9','B00922759','44','06:10','07:25','2025-01-18','Expired');

INSERT INTO RESERVATION VALUES ('19','10','B00533867','95','14:05','15:20','2025-01-18','Completed');

INSERT INTO RESERVATION VALUES ('20','10','B00533867','104','15:05','16:20','2025-01-18','Completed');

INSERT INTO RESERVATION VALUES ('21','11','B00031932','239','14:00','15:15','2025-01-18','Canceled');

INSERT INTO RESERVATION VALUES ('22','11','B00031932','251','15:00','16:15','2025-01-19','Canceled');

INSERT INTO RESERVATION VALUES ('23','12','B00687482','22','13:00','14:15','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('24','12','B00687482','29','14:00','15:15','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('25','13','B00411891','189','03:10','04:25','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('26','13','B00411891','196','04:10','05:25','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('27','14','B00706143','222','00:15','01:30','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('28','14','B00706143','233','01:15','02:30','2025-01-19','Completed');

INSERT INTO RESERVATION VALUES ('29','15','B00460180','353','16:05','17:20','2025-01-20','Completed');

INSERT INTO RESERVATION VALUES ('30','15','B00460180','360','17:05','18:20','2025-01-20','Completed');

INSERT INTO RESERVATION VALUES ('31','16','B00533867','101','10:10','11:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('32','16','B00533867','110','11:10','12:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('33','17','B00801893','164','02:00','03:15','2025-01-21','Canceled');

INSERT INTO RESERVATION VALUES ('34','17','B00801893','176','03:00','04:15','2025-01-21','Canceled');

INSERT INTO RESERVATION VALUES ('35','18','B00031932','243','06:10','07:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('36','18','B00031932','255','07:10','08:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('37','19','B00013605','258','08:10','09:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('38','19','B00013605','264','09:10','10:25','2025-01-21','Completed');

INSERT INTO RESERVATION VALUES ('39','20','B00406057','320','06:10','07:25','2025-01-22','Completed');

INSERT INTO RESERVATION VALUES ('40','20','B00406057','327','07:10','08:25','2025-01-22','Completed');

INSERT INTO RESERVATION VALUES ('41','21','B00801893','172','20:15','21:30','2025-01-22','Canceled');

INSERT INTO RESERVATION VALUES ('42','21','B00801893','173','21:15','22:30','2025-01-22','Canceled');

INSERT INTO RESERVATION VALUES ('43','22','B00103489','2','01:05','02:20','2025-01-22','Completed');

INSERT INTO RESERVATION VALUES ('44','22','B00103489','6','02:05','03:20','2025-01-22','Completed');

INSERT INTO RESERVATION VALUES ('45','23','B00342857','46','12:05','13:20','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('46','23','B00342857','57','13:05','14:20','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('47','24','B00485217','116','20:15','21:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('48','24','B00485217','125','21:15','22:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('49','25','B00632488','170','06:15','07:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('50','25','B00632488','179','07:15','08:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('51','26','B00342857','53','01:15','02:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('52','26','B00342857','61','02:15','03:30','2025-01-23','Completed');

INSERT INTO RESERVATION VALUES ('53','27','B00562616','213','12:05','13:20','2025-01-24','Completed');

INSERT INTO RESERVATION VALUES ('54','27','B00562616','224','13:05','14:20','2025-01-24','Completed');

INSERT INTO RESERVATION VALUES ('55','28','B00464518','291','09:15','10:30','2025-01-24','Completed');

INSERT INTO RESERVATION VALUES ('56','28','B00464518','294','10:15','11:30','2025-01-24','Completed');

INSERT INTO RESERVATION VALUES ('57','29','B00567723','37','09:00','10:15','2025-01-25','Completed');

INSERT INTO RESERVATION VALUES ('58','29','B00567723','44','10:00','11:15','2025-01-25','Completed');

INSERT INTO RESERVATION VALUES ('59','30','B00707428','102','18:00','19:15','2025-01-25','Completed');

INSERT INTO RESERVATION VALUES ('60','30','B00707428','107','19:00','20:15','2025-01-25','Completed');

INSERT INTO RESERVATION VALUES ('61','31','B00960578','81','00:10','01:25','2025-01-26','Completed');

INSERT INTO RESERVATION VALUES ('62','31','B00960578','88','01:10','02:25','2025-01-26','Completed');

INSERT INTO RESERVATION VALUES ('63','32','B00662788','201','21:15','22:30','2025-01-26','Reserved');

INSERT INTO RESERVATION VALUES ('64','32','B00662788','107','22:15','23:30','2025-01-26','Reserved');

INSERT INTO RESERVATION VALUES ('65','33','B00406057','320','05:15','06:30','2025-01-27','Reserved');

INSERT INTO RESERVATION VALUES ('66','33','B00406057','328','06:15','07:30','2025-01-27','Reserved');

INSERT INTO RESERVATION VALUES ('67','34','B00223806','123','14:15','15:30','2025-01-27','Reserved');

INSERT INTO RESERVATION VALUES ('68','34','B00223806','128','15:15','16:30','2025-01-27','Reserved');

INSERT INTO RESERVATION VALUES ('69','35','B00881247','307','10:15','11:30','2025-01-27','Canceled');

INSERT INTO RESERVATION VALUES ('70','35','B00881247','313','11:15','12:30','2025-01-27','Canceled');

INSERT INTO RESERVATION VALUES ('71','36','B00637066','221','09:00','10:15','2025-01-28','Reserved');

INSERT INTO RESERVATION VALUES ('72','36','B00637066','228','10:00','11:15','2025-01-28','Reserved');

INSERT INTO RESERVATION VALUES ('73','37','B00881247','299','09:05','10:20','2025-01-29','Reserved');

INSERT INTO RESERVATION VALUES ('74','37','B00881247','310','10:05','11:20','2025-01-29','Reserved');

INSERT INTO RESERVATION VALUES ('75','38','B00223806','124','00:05','01:20','2025-01-30','Reserved');

INSERT INTO RESERVATION VALUES ('76','38','B00223806','133','01:05','02:20','2025-01-30','Reserved');

INSERT INTO RESERVATION VALUES ('77','39','B00460180','359','15:10','16:25','2025-01-30','Reserved');

INSERT INTO RESERVATION VALUES ('78','39','B00460180','365','16:10','17:25','2025-01-30','Reserved');

VI. MAINTENANCE_REQUEST

INSERT INTO MAINTENANCE_REQUEST VALUES ('1','96','1','2020-04-21','Leaking','2020-04-25','Adjusted alignment','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('2','150','1','2020-05-14','Not draining','2020-05-24','Cleared blockage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('3','252','2','2020-06-27','No power','2020-07-15','Cleared blockage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('4','146','2','2021-01-18','Excessive noise','2021-01-21','Inspected for damage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('5','259','1','2021-03-04','Not draining','2021-03-09','Cleared blockage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('6','95','1','2021-04-13','Not draining','2021-04-15','Inspected for damage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('7','267','1','2021-04-28','Not draining','2021-05-23','Reset power supply','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('8','70','1','2021-07-07','No power','2021-07-18','Reset power supply','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('9','10','2','2021-10-12','Takes too long to dry','2021-11-01','Adjusted alignment','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('10','66','1','2022-04-27','Leaking','2022-05-10','Lubricated moving parts','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('11','328','2','2022-07-25','Takes too long to dry','2022-08-25','Inspected for damage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('12','94','1','2022-10-07','Leaking','2022-10-22','Reset power supply','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('13','156','2','2022-11-14','Takes too long to dry','2022-11-15','Reset power supply','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('14','298','2','2023-02-16','Excessive noise','2023-03-10','Replaced faulty part','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('15','288','2','2023-03-17','Excessive noise','2023-03-26','Adjusted alignment','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('16','6','2','2023-04-27','Excessive noise','2023-04-27','Reset power supply','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('17','137','1','2023-10-18','Not spinning','2023-10-19','Adjusted alignment','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('18','4','1','2024-06-02','Bad odor','2024-06-05','Inspected for damage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('19','281','2','2024-07-05','Takes too long to dry','2024-07-31','Adjusted alignment','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('20','202','1','2024-11-03','No power','2024-11-30','Inspected for damage','Closed');

INSERT INTO MAINTENANCE_REQUEST VALUES ('21','339','1','2025-01-16','Leaking',NULL,NULL,'Received');

INSERT INTO MAINTENANCE_REQUEST VALUES ('22','164','1','2025-01-21','Not draining',NULL,NULL,'Repair in Progress');

INSERT INTO MAINTENANCE_REQUEST VALUES ('23','156','2','2025-02-07','Takes too long to dry',NULL,NULL,'Received');

Displaying the Tables

SELECT * FROM STUDENT;

SELECT * FROM MACHINE;

SELECT * FROM MACHINE_TYPE;

SELECT * FROM RESERVATION;

SELECT * FROM BUILDING;

SELECT * FROM MAINTENANCE_REQUEST;

Reports

I. Report 1

SELECT M.machine_id, M.installation_date, R.request_id, R.request_date, R.repair_date

FROM MACHINE M LEFT JOIN MAINTENANCE_REQUEST R

ON M.machine_id = R.machine_id

WHERE installation_date < '2015-02-01'

ORDER BY installation_date;

II. Report 2

SELECT building_id, COUNT(DISTINCT(time_id)) AS laundry_sessions

FROM RESERVATION R, MACHINE M

WHERE R.machine_id = M.machine_id

GROUP BY building_id

```
ORDER BY COUNT(DISTINCT(time_id)) DESC;
```

III. Report 3

```
SELECT *
FROM MAINTENANCE_REQUEST R
WHERE request_date < '2025-2-01' AND repair_date IS NULL;
```

IV. Report 4

```
SELECT S.student_name, S.student_id, S.building_id, COUNT(DISTINCT(time_id))
FROM RESERVATION R RIGHT JOIN STUDENT S
ON R.student_id = S.student_id
GROUP BY S.student_id
HAVING COUNT(DISTINCT(time_id)) = 0;
```

V. Report 5

```
SELECT machine_id
FROM RESERVATION
WHERE reservation_status = 'Canceled'AND machine_id IN (SELECT machine_id
                                                        FROM MAINTENANCE_REQUEST
                                                        WHERE repair_date < '2022-02-01');
```

VI. Report 6

```
ALTER TABLE MACHINE
ADD COLUMN maintenance_frequency INT;


SET SQL_SAFE_UPDATES = 0;


UPDATE MACHINE
SET maintenance_frequency = (SELECT COUNT(*)
FROM MAINTENANCE_REQUEST R
WHERE R.machine_id = MACHINE.machine_id
```

```
GROUP BY machine_id);


SELECT * FROM MACHINE;
```

VII. Report 7

```
SELECT issue_description, COUNT(*) AS issue_frequency

FROM MAINTENANCE_REQUEST R, MACHINE_TYPE T

WHERE R.machine_type = T.type_id

GROUP BY issue_description

ORDER BY issue_frequency DESC;
```

VIII. Report 8

```
SELECT S.student_id, student_name, start_time, end_time, reservation_status

FROM STUDENT S, RESERVATION R, MACHINE M

WHERE S.student_id = R.student_id AND R.machine_id = M.machine_id AND machine_type
= '1'

    AND (start_time >= '22:00:00' OR start_time < '06:00:00')

    AND (reservation_status = 'Completed' OR reservation_status = 'Reserved')

ORDER BY student_name;
```

IX. Report 9

```
SELECT DAYNAME(reservation_date), COUNT(*)

FROM RESERVATION

GROUP BY DAYNAME(reservation_date)

ORDER BY DAYNAME(reservation_date) DESC;
```

X. Report 10

```
SELECT B.building_id, (washer_count/dryer_count) AS 'washer/dryer_ratio',
ROUND(student_count/washer_count)

        AS 'student/washer_ratio', ROUND(student_count/dryer_count) AS
'student/dryer_ratio', student_count,

    COUNT(DISTINCT(time_id)) AS loads_done
```

```
FROM BUILDING B, MACHINE M, RESERVATION R
WHERE B.building_id = M.building_id AND M.machine_id = R.machine_id
GROUP BY building_id;
```