University of British Columbia, Vancouver
Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 2

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Group Number: 33

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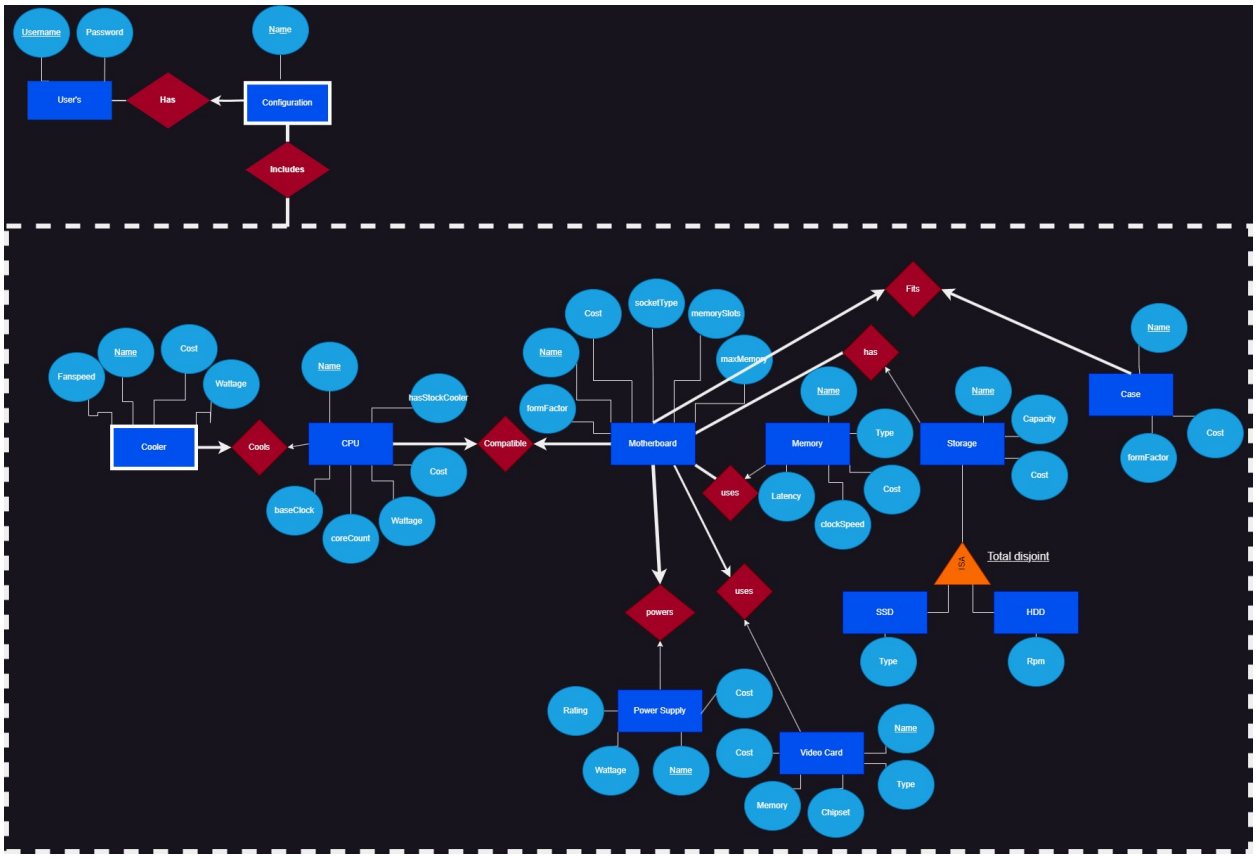
By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

Project Description

The application will provide a platform for users to browse through and select PC components for building custom computers. They will be able to search for specific parts, compare various options and check for intercompatibility between components.

ER Diagram



*changes to ER diagram: renamed a couple fields (eg. Price → Cost) for consistency, removed ‘Type’ attribute from Case as it was unnecessary, changed all attributes to camel case.

ER Diagram Schema

Users(Username: varchar(20), Password: varchar(40))

- Primary key: Username, all fields must be not null

Configurations(Name: varchar(40), **User**)

- Primary key: **User**, Name (User is foreign key), all fields must be not null

Cooler(Name: varchar(40), Cost: int, Fanspeed: int, Wattage: int)

- Primary key: Name, all fields must be not null

CPU(Name: varchar(40), Cost: int, baseClock: float(3), coreCount: int, Wattage: int, hasStockCooler: int)
- Primary key: Name, all fields must be not null

Motherboard(Name: varchar(40), Cost: int, formFactor: varchar(10), socketType: varchar(10), memorySlots: int, maxMemory: int)
- Primary key: Name, all fields must be not null

Memory(Name: varchar(40), Cost: int, type: varchar(10), Size: int, clockSpeed: int)
- Primary key: Name, all fields must be not null

Case(Name: varchar(40), Cost: int, formFactor: varchar(10))
- Primary key: Name, all fields must be not null

PowerSupply(Name: varchar(40), Cost: int, Rating: varchar(10), Wattage: int)
- Primary key: Name, all fields must be not null

VideoCard(Name: varchar(40), Cost: int, Memory: int, Chipset: varchar(10), Wattage: int, Brand: varchar(10))
- Primary key: Name, all fields must be not null

SSD(Name: varchar(40), Cost: int, Capacity: int, Type: varchar(10))
- Primary key: Name, all fields must be not null

HDD(Name: varchar(40), Cost: int, Capacity: int, Rpm: int)
- Primary key: Name, all fields must be not null

Functional Dependencies

*note: the functional dependencies listed out in this project are generally not representative of real life PC components. Normally, the component's name would give us all its other attributes (eg. having the CPU model name of 'Intel i7 7700k' would give us a base clock of 4.20, core count of 4, wattage of 91, a stock cooler and an MSRP of $339. However, for the purpose of the project requirements, we will be creating some FDs that are generally true, such as the base clock and core count giving us the cost and wattage attributes.

User
Username → Password

Configurations
Name, Username → User

Cooler
Fan Speed → Wattage, Cost

CPU
baseClock, Core count → Cost, Wattage
Name → Base clock, Core count

Motherboard
Memory Slots → Max Memory
Form Factor → Memory Slots
Form Factor, Memory Slots, Max Memory → Cost

Power Supply
Rating, Wattage → Cost

Video Card
Memory → Cost
Chipset→ Brand

Memory
Type, Size, Clock Speed → Cost

Storage
Capacity → Cost

Case
Type → Form Factor

Normalization *(The relations are in reverse order compared to the method we did in class so R1 would be R2 here)*

User
Username > Password
R: Username, Password

Configuration
Name, Username → User
R: Name, Username, User

Cooler
Fan Speed → Wattage, Cost
CK: Name, Fan Speed

R1: Name, Fanspeed
R2: Fanspeed, Wattage, Cost

CPU
baseClock, Core count → Cost, Wattage
Name → Base clock, Core count
CK:Name, hasStockCooler

R1: Name, hasStockCooler, Cost, Wattage
R2: Name, Base clock, Core count

Motherboard
Memory Slots → Max Memory
Form Factor → Memory Slots
Form Factor, Memory Slots, Max Memory → Cost
CK: Name, Form Factor, SocketType

~~R1: Memory Slots, Form Factor, Name, Cost, Socket Type~~ (Not in BCNF)
R2: Memory Slots, Max Memory
R3: Name, Socket Type, Form Factor, Cost
R4: Form Factor, Memory Slots

Power Supply
Rating, Wattage → Cost
CK: Rating, Wattage, Name

R1: Name, Rating, Wattage
R2: Rating, Wattage, Cost

Video Card
Memory → Cost
Type → Chipset
CK: Name, Memory, Type , Wattage

R1: ~~Name, Type , Wattage, Memory, Chipset~~ (Not in BCNF)
R2: Memory, Cost
R3: Name, Memory, Type , Wattage
R4: Type ,Chipset

Memory
Type, Size, Clock Speed → Cost
CK: Name, Type, Size, Clock Speed

R1: Name, Type, Size, Clock Speed
R2: Type, Size, Clock Speed, Cost

Storage (SSD)
Capacity → Cost
CK: Capacity, Name

R1: Name, Capacity, Type
R2: Capacity, Cost

Storage (HDD)
Capacity → Cost
CK: Capacity, Name

R1: Name, Capacity, RPM
R2: Capacity, Cost

Case
Type → Form Factor
CK: Name, Cost, Type

R1: Cost, Name, Type
R2: Type, Form Factor

SQL DDL Statements

User

```
CREATE TABLE user (
        Username varchar(20) NOT NULL,
        Password varchar(40) NOT NULL,
        Primary Key(Username)
)
```

Table SQL (normalized to BCNF)

Cooler

```
CREATE TABLE Cooler_R1 (
  Name VARCHAR(255) PRIMARY KEY,
  Fanspeed INT
);
```

```
CREATE TABLE Cooler_R2 (
  Fanspeed INT PRIMARY KEY,
  Wattage INT,
  Cost DECIMAL(10, 2)
);
```

CPU

```
CREATE TABLE CPU_R1 (
  Name VARCHAR(255) PRIMARY KEY,
  hasStockCooler BOOLEAN,
  Cost DECIMAL(10, 2),
  Wattage INT
);


CREATE TABLE CPU_R2 (
  Name VARCHAR(255) PRIMARY KEY,
  BaseClock DECIMAL(5, 2) NOT NULL,
  CoreCount INT NOT NULL
);
```

Motherboard

```
CREATE TABLE Motherboard_R2 (
  Name VARCHAR(255) PRIMARY KEY,
  MemorySlots INT NOT NULL,
  MaxMemory INT NOT NULL
);

CREATE TABLE Motherboard_R3 (
  Name VARCHAR(255) PRIMARY KEY,
  SocketType VARCHAR(50) NOT NULL,
  FormFactor VARCHAR(50) NOT NULL,
  Cost DECIMAL(10, 2)
);

CREATE TABLE Motherboard_R4 (
  FormFactor VARCHAR(50) PRIMARY KEY,
  MemorySlots INT NOT NULL
```

```
);
```

Power Supply

```
CREATE TABLE PowerSupply_R1 (
  Name VARCHAR(255) PRIMARY KEY,
  Rating VARCHAR(50) NOT NULL,
  Wattage INT
);

CREATE TABLE PowerSupply_R2 (
  Rating VARCHAR(50) PRIMARY KEY,
  Wattage INT,
  Cost DECIMAL(10, 2) NOT NULL
);
```

Video Card

```
CREATE TABLE VideoCard_R2 (
  Memory INT PRIMARY KEY,
  Cost DECIMAL(10, 2) NOT NULL
);

CREATE TABLE VideoCard_R3 (
  Name VARCHAR(255) PRIMARY KEY,
  MemoryType VARCHAR(50),
  Wattage INT NOT NULL
);

CREATE TABLE VideoCard_R4 (
  Type VARCHAR(50) PRIMARY KEY,
  Chipset VARCHAR(255) NOT NULL,
);
```

Memory

```
CREATE TABLE Memory_R1 (
  Name VARCHAR(255) PRIMARY KEY,
  Type VARCHAR(50) NOT NULL,
  Size INT NOT NULL,
```

```
  ClockSpeed INT NOT NULL
);

CREATE TABLE Memory_R2 (
  Type VARCHAR(50) NOT NULL,
  Size INT NOT NULL,
  ClockSpeed INT NOT NULL,
  Cost DECIMAL(10, 2) NOT NULL
PRIMARY KEY(Type, Size, Clockspeed, Cost)
);
```

Storage

```
CREATE TABLE Storage_R1 (
  Name VARCHAR(255) PRIMARY KEY,
  Capacity INT NOT NULL
);

CREATE TABLE Storage_R2 (
  Capacity INT PRIMARY KEY,
  Cost DECIMAL(10, 2) NOT NULL
);
```

Case

```
CREATE TABLE Case_R1 (
  Cost DECIMAL(10, 2) NOT NULL,
  Name VARCHAR(255) PRIMARY KEY,
  Type VARCHAR(50) NOT NULL
);

CREATE TABLE Case_R2 (
  Type VARCHAR(50) PRIMARY KEY,
  FormFactor VARCHAR(50) NOT NULL
);
```

Data Insertion Statements

Cooler_R1

```
INSERT INTO Cooler_R1 (Name, Fanspeed)
VALUES
  (‘be quiet! Dark Rock Pro 4’, 1500),
  ('Noctua NH-U12S chromax.black', 1500),
  (‘NZXT Kraken X73’, 2000),
  (‘ARCTIC Liquid Freezer II 360’, 2000),
  (‘Thermalright Assassin X 120 Refined SE’, 1550),
  ('ID-COOLING SE-214-XT', 1550);
```

Cooler_R2

```
INSERT INTO Cooler_R2 (Name, Fanspeed, Wattage, Cost)
VALUES
  (‘be quiet! Dark Rock Pro 4’, 1500, 10, 89.99),
  ('Noctua NH-U12S chromax.black', 1500, 10, 89.99),
  (‘NZXT Kraken X73’, 2000, 20, 149.99),
  (‘ARCTIC Liquid Freezer II 360’, 2000, 20, 149.99),
  (‘Thermalright Assassin X 120 Refined SE’, 1550, 10, 19.99),
  ('ID-COOLING SE-214-XT', 1550, 10, 19.99);
```

CPU_R1

```
INSERT INTO CPU_R1 (Name, hasStockCooler, Cost, Wattage)
VALUES
  ('Intel Core i9-11900K', true, 499.99, 95),
  ('AMD Ryzen 7 5800X', false, 449.99, 105),
  ('Intel Core i5-12600K', true, 269.99, 125),
  ('AMD Ryzen 9 5950X', false, 799.99, 105),
  ('Intel Core i7-10700K', true, 399.99, 125),
  ('AMD Ryzen 5 7600X', false, 299.99, 65);
```

CPU_R2

```
INSERT INTO CPU_R2 (Name, BaseClock, CoreCount)
VALUES
  ('Intel Core i9-11900K', 3.6, 8),
  ('AMD Ryzen 7 5800X', 3.8, 8),
  ('Intel Core i5-12600K', 3.9, 6),
  ('AMD Ryzen 9 5950X', 3.4, 16),
  ('Intel Core i7-10700K', 3.8, 8),
```

('AMD Ryzen 5 7600X', 3.7, 6);

Motherboard_R2

```
INSERT INTO Motherboard_R2 (Name, MemorySlots, MaxMemory)
VALUES
  ('ASUS ROG Strix X570-E Gaming', 4, 128),
  ('GIGABYTE B550 AORUS PRO', 4, 128),
  ('MSI MAG B460 TOMAHAWK', 4, 128),
  ('ASRock B450M PRO4', 4, 64),
  ('ASUS PRIME Z590-A', 4, 128),
  ('MSI MPG X570 GAMING PLUS', 4, 128);
```

Motherboard_R3

```
INSERT INTO Motherboard_R3 (Name, SocketType, FormFactor, Cost)
VALUES
  ('ASUS ROG Strix X570-E Gaming', 'AM4', 'ATX', 299.99),
  ('GIGABYTE B550 AORUS PRO', 'AM4', 'ATX', 179.99),
  ('MSI MAG B460 TOMAHAWK', 'LGA1200', 'ATX', 129.99),
  ('ASRock B450M PRO4', 'AM4', 'Micro ATX', 89.99),
  ('ASUS PRIME Z590-A', 'LGA1200', 'ATX', 249.99),
  ('MSI MPG X570 GAMING PLUS', 'AM4', 'ATX', 169.99);
```

Motherboard_R4

```
INSERT INTO Motherboard_R4 (FormFactor, MemorySlots)
VALUES
  ('ATX', 4),
  ('Micro ATX', 2),
  ('ATX', 4),
  ('Micro ATX', 2),
  ('ATX', 4),
  ('ATX', 4);
```

PowerSupply_R1

```
INSERT INTO PowerSupply_R1 (Name, Rating, Wattage)
VALUES
  ('EVGA SuperNOVA 750 G5', '80 Plus Gold', 750),
  ('Corsair RM750x', '80 Plus Gold', 750),
```

('Seasonic Focus GX-650', '80 Plus Gold', 650),
('NZXT C850', '80 Plus Gold', 850),
('Thermaltake Toughpower Grand RGB 750W', '80 Plus Gold', 750),
('Cooler Master MWE Gold 650 V2', '80 Plus Gold', 650);

PowerSupply_R2

```
INSERT INTO PowerSupply_R2 (Rating, Wattage, Cost)
VALUES
  ('80 Plus Gold', 750, 129.99),
  ('80 Plus Platinum', 850, 249.99),
  ('80 Plus Gold', 650, 119.99),
  ('80 Plus Bronze', 550, 89.99),
  ('80 Plus Gold', 750, 129.99),
  ('80 Plus Bronze', 450, 69.99);
```

VideoCard_R2

```
INSERT INTO VideoCard_R2 (Name, Memory, Cost)
VALUES
  ('NVIDIA GeForce RTX 3080', 10, 699.99),
  ('AMD Radeon RX 6800 XT', 16, 649.99),
  ('NVIDIA GeForce RTX 4070 Ti', 12, 499.99),
  ('AMD Radeon RX 6700 XT', 12, 499.99),
  ('NVIDIA GeForce RTX 3060 Ti', 8, 399.99),
  ('NVIDIA GeForce RTX 4090', 24, 1999.99);
```

VideoCard_R3

```
INSERT INTO VideoCard_R3 (Name, Wattage, MemoryType)
VALUES
  ('NVIDIA GeForce RTX 3080', 250,  'GDDR6X'),
  ('AMD Radeon RX 6800 XT', 250, 'GDDR6'),
  ('NVIDIA GeForce RTX 4070 Ti', 285, 'GDDR6X'),
  ('AMD Radeon RX 6700 XT', 250, 'GDDR6'),
  ('NVIDIA GeForce RTX 3060 Ti', 250, 'GDDR6'),
  ('NVIDIA GeForce RTX 4090', 450, ‘GDDR6X’);
```

VideoCard_R4

```
INSERT INTO VideoCard_R4 (Brand, Chipset)
VALUES
  (‘NVIDIA’, 'NVIDIA GeForce RTX 3080'),
```

(‘AMD’, 'AMD Radeon RX 6800 XT'),
(‘NVIDIA’, 'NVIDIA GeForce RTX 4070 Ti'),
(‘AMD’, 'AMD Radeon RX 6700 XT'),
(‘NVIDIA’, 'NVIDIA GeForce RTX 3060 Ti'),
(‘NVIDIA’, 'NVIDIA GeForce RTX 4090')

Memory_R1

```
INSERT INTO Memory_R1 (Name, Type, Size, ClockSpeed)
VALUES
  ('Corsair Vengeance LPX', 'DDR4', 16, 3200),
  ('G.Skill Trident Z RGB', 'DDR4', 16, 3600),
  ('Crucial Ballistix', 'DDR4', 16, 3200),
  ('G.Skill Flare X 5’, 32 GB', 'DDR5', 36, 3000),
  ('Team T-Force Delta RGB', 'DDR4', 16, 3200),
  ('Corsair Vengeance 32 GB', 'DDR5', 32, 5000);
```

Memory_R2

```
INSERT INTO Memory_R2 (Type, Size, ClockSpeed, Cost)
VALUES
  ('DDR4', 16, 3200, 79.99),
  ('DDR4', 16, 3600, 99.99),
  ('DDR4', 16, 3200, 79.99),
  ('DDR4', 36, 6000, 99.99),
  ('DDR4', 16, 3200, 89.99),
  ('DDR5', 36, 6000, 99.99);
```

SSD_Storage_R1

```
INSERT INTO Storage_R1 (Name, Capacity, Type)
VALUES
  ('Samsung 970 EVO Plus', 1000, ‘M.2 PCIe 3.0 X4’),
  ('Crucial MX500', 2000, ‘SATA 6.0Gb/s’),
  ('Samsung 980 Pro', 1000, ‘M.2 PCIe 3.0 X4’),
  ('Kingston NV2', 1000, ‘M.2 PCIe 4.0 X4’),
  ('Crucial P5 Plus', 2000, ‘M.2 PCIe 4.0 X4’),
  ('Sabrent Rocket 4 Plus', 8000, ‘M.2 PCIe 4.0 X4’);
```

SSD_Storage_R2

```
INSERT INTO Storage_R2 (Capacity, Cost)
VALUES
  (1000, 59.99),
  (2000, 84.99),
  (1000, 59.99),
  (1000, 59.99),
  (2000, 84.99),
  (8000, 999.99);
```

HDD_Storage_R1

```
INSERT INTO Storage_R1 (Name, Capacity, RPM)
VALUES
  ('Western Digital Caviar Blue', 1000, 7200),
  ('Western Digital Blue', 2000, 7200),
  ('Toshiba DT01ACA100', 1000, 7200),
  ('Seagate Barracuda Compute', 2000, 7200),
  ('Seagate Barracuda', 4000, 5400),
  ('Seagate IronWolf Pro NAS', 22000, 7200);
```

HDD_Storage_R2

```
INSERT INTO Storage_R2 (Capacity, Cost)
VALUES
  (1000, 34.99),
  (2000, 49.99),
  (1000, 34.99),
  (2000, 49.99),
  (4000, 59.99),
  (22000, 352.99);
```

Case_R1

```
INSERT INTO Case_R1 (Cost, Name, Type)
VALUES
  (99.99, 'NZXT H710i', 'ATX Mid Tower'),
  (79.99, 'Fractal Design Meshify C', 'ATX Mid Tower'),
  (149.99, 'Corsair Obsidian 500D', 'ATX Full Tower'),
  (69.99, 'Phanteks Eclipse P300', 'ATX Mid Tower'),
  (89.99, 'Cooler Master MasterBox MB511', 'ATX Mid Tower'),
  (59.99, 'Thermaltake Versa H17', 'Micro ATX');
```

Case_R2

```
INSERT INTO Case_R2 (Type, FormFactor)
VALUES
  ('ATX Mid Tower', 'ATX'),
  ('ATX Mid Tower', 'ATX'),
  ('ATX Full Tower', 'ATX'),
  ('ATX Mid Tower', 'ATX'),
  ('ATX Mid Tower', 'ATX'),
  ('Micro ATX', 'Micro ATX');
```