

Final Exam

Description

Write your full name and `net_id` on the top right corner of this page.

Answer the database design and application questions.

Also complete the logical database design exercises.

Good Luck!

Submission Instructions

Hand-in your exam booklet to an instructor when finished.

Evaluation Criteria

See individual question weights for a break-down.

After being evaluated, each student's submission will be ranked. These rankings may positively impact final grades.

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Section I: Database Design and Application Concepts

Answer each question in English in the space provided.

1. What is the primary goal and purpose of the Normalization process in database design? (10% weight)

2. What quantifiable benefits do businesses or organizations receive from implementing data validation controls on forms that input data into their databases? (5% weight)

3. What is the definition and purpose of an Application Protocol Interface (API)? Name a real world API, describe how it works, and describe the value it brings to one or more businesses or organizations. (10% weight)

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Section II: Logical Database Design

Reference the provided table relations.

For each relation, design a relational database to store the data in the most optimal way. Represent your design by drawing an Entity Relationship Diagram (ERD) in the space provided.

Each ERD should:

- Communicate with clarity the proper logical database design
- Represent all **entities**, and for each:
 - Represent any known or likely **attributes**
 - Denote each **primary key** attribute with (pk)
 - Denote each **foreign key** attribute with (fk)
- Represent all direct **relationships** between entities, and for each:
 - Denote relationship **cardinality**, for each direction
 - Optionally denote relationship optionality, for each direction
 - Optionally describe the relationship in English, for each direction

State assumptions as necessary to justify answers.

You may make scratch-notes, but only ERDs will be considered for evaluation.

1. Video Games (20% weight)

2. Health Inspection Scores (15% weight)

3. Company Blog (20% weight)

4. Chronic Disease Indicators (20% weight)

Relation #1: Video Games

| id | name | publisher | pubUrl | year | platId | platform | predecessor | predName |
|----|-------------------------|-----------------|--------------|------|--------|-------------------------------------|-------------|----------------------|
| 3 | Mario Bros. | Nintendo | nintendo.com | 1983 | 1 | Nintendo Entertainment System (NES) | | |
| 5 | Super Mario Bros. | Nintendo | nintendo.com | 1985 | 1 | Nintendo Entertainment System (NES) | | |
| 7 | Super Mario Bros. II | Nintendo | nintendo.com | 1988 | 1 | Nintendo Entertainment System (NES) | 5 | Super Mario Bros. |
| 9 | Super Mario Bros. III | Nintendo | nintendo.com | 1988 | 1 | Nintendo Entertainment System (NES) | 7 | Super Mario Bros. II |
| 11 | Super Mario 64 | Nintendo | nintendo.com | 1996 | 2 | Nintendo 64 (N64) | | |
| 13 | Madden NFL 99 | Electronic Arts | ea.com | 1998 | 2 | Nintendo 64 (N64) | | |
| 15 | Super Smash Bros. | Nintendo | nintendo.com | 1999 | 2 | Nintendo 64 (N64) | | |
| 17 | Mario Tennis | Nintendo | nintendo.com | 2000 | 2 | Nintendo 64 (N64) | | |
| 19 | Mario Tennis | Nintendo | nintendo.com | 2001 | 3 | Game Boy Color | | |
| 21 | Super Smash Bros. Melee | Nintendo | nintendo.com | 2001 | 4 | Nintendo GameCube | | |
| 23 | Super Mario Galaxy | Nintendo | nintendo.com | 2007 | 5 | Wii | | |
| 25 | Super Smash Bros. Brawl | Nintendo | nintendo.com | 2008 | 5 | Wii | | |
| 27 | Super Super Galaxy 2 | Nintendo | nintendo.com | 2010 | 5 | Wii | 23 | Super Mario Galaxy |
| 29 | Madden NFL Football | Electronic Arts | ea.com | 2011 | 6 | Nintendo 3DS | | |

Relation #2: Health Inspection Scores

businesses table

| id | name | address |
|-------------|---------------|-------------|
| 06FOOD-6666 | Starbucks | Eye Street |
| 07FOOD-7777 | Starbucks | K Street |
| 08FOOD-8888 | Dunkin Donuts | 22nd Street |
| 09FOOD-9999 | Dolcezza | 14th Street |

inspections table

| id | business_id | date | score | type |
|----|-------------|----------|-------|-----------|
| 1 | 07FOOD-7777 | 1/1/2015 | 50 | routine |
| 2 | 08FOOD-8888 | 1/1/2015 | 50 | routine |
| 3 | 09FOOD-9999 | 1/1/2015 | 100 | routine |
| 4 | 07FOOD-7777 | 4/4/2015 | 75 | follow-up |
| 5 | 08FOOD-8888 | 4/4/2015 | 75 | follow-up |

violations table

| id | business_id | date | code | description |
|-----|-------------|----------|------|-----------------------------------|
| 101 | 07FOOD-7777 | 1/1/2015 | RR | rats |
| 102 | 07FOOD-7777 | 1/1/2015 | OO | slight odor |
| 103 | 08FOOD-8888 | 1/1/2015 | RR | lots of rats all over the basemen |
| 104 | 08FOOD-8888 | 1/1/2015 | OO | odor |
| 105 | 07FOOD-7777 | 4/4/2015 | RR | rats |
| 106 | 08FOOD-8888 | 4/4/2015 | RR | still some rats in the basement |

Relation #3: Company Blog

| post_id | post_title | author_id | author_name | tags | comment1 | commenter1 | commenter1_name | comment2 | commenter2 | commenter2_name |
|---------|-------------------------------|-----------|-------------|--|------------------------|------------|-----------------|------------------------|------------|-----------------|
| p1 | Hello World | u1 | Mark | | whoa cool. | u5 | David | hello back. | u6 | Ron |
| p2 | Company Mission | u9 | Charlie | | totally inspiring. | u15 | Janet | i love it. | u17 | Bianca |
| p3 | New Feature | u5 | David | product, design | looks good. | u15 | Janet | change the text color. | u1 | Mark |
| p4 | Welcome New Hires | u9 | Charlie | human-resources | the new hire is great. | u6 | Ron | | | |
| p5 | Social Media Policies | u9 | Charlie | human-resources, social-media | bummer. | u3 | Bill | | | |
| p6 | Privacy and Security Policies | u6 | Ron | product, cookies, encryption, authentication | | | | | | |

Relation #4: Chronic Disease Indicators

| category | indicatorId | indicator | location | locationName | year | stratId | stratifier | value |
|------------------------|-------------|---|----------|----------------------|------|---------|------------|-------|
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | DC | District of Columbia | 2010 | GENM | Male | 52.42 |
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | DC | District of Columbia | 2010 | GENF | Female | 68.98 |
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | DC | District of Columbia | 2010 | GENT | Total | 61.16 |
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | VA | Virginia | 2010 | GENM | Male | 69.74 |
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | VA | Virginia | 2010 | GENF | Female | 84.44 |
| Cardiovascular Disease | CVD1_4 | Mortality from heart failure (cases per 1K) | VA | Virginia | 2010 | GENT | Total | 77.23 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | DC | District of Columbia | 2013 | GENM | Male | 28.2 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | DC | District of Columbia | 2013 | GENF | Female | 17.1 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | DC | District of Columbia | 2013 | GENT | Total | 22.4 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | VA | Virginia | 2013 | GENM | Male | 22 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | VA | Virginia | 2013 | GENF | Female | 10.3 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | VA | Virginia | 2013 | GENT | Total | 15.9 |
| Tobacco | TOB10_0 | Sale of cigarette packs (per person) | DC | District of Columbia | 2013 | GENT | Total | 18.6 |
| Tobacco | TOB10_0 | Sale of cigarette packs (per person) | VA | Virginia | 2013 | GENT | Total | 69.4 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | DC | District of Columbia | 2015 | GENT | Total | 20.2 |
| Alcohol | ALC2_2 | Binge drinking prevalence (%) | VA | Virginia | 2015 | GENT | Total | 15.7 |