Zili&Jiabo_6210_HW2

February 22, 2020

1 Get and Normalize Video Game Database

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1.1 Abstract

We are working on a video game database with information gathered from giantbomb.com API. At first we will create a conceptual schema and a physical schema. Next, we will download the data in 1st NF and loaded into MySQL Server, and perform operations to get it in 2nd NF and 3rd NF. After auditing the data, we will answer the questions on assignment2 instruction and summarize in the report.

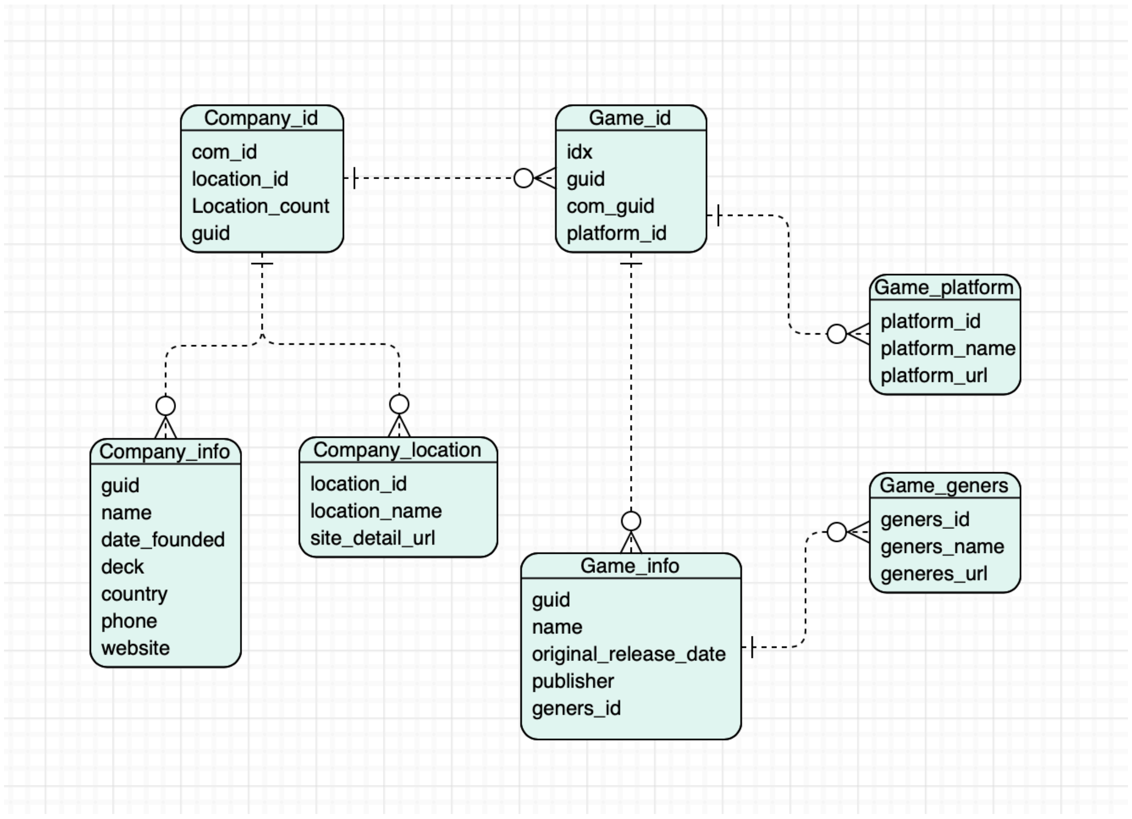
1.2 Data

Data sources: https://www.giantbomb.com/forums/api-developers-3017/ Data consists of: Detailed video game company information and video game information.

1.3 Create Conceptual Model:

[78]:
```
from IPython.display import Image
Image("Conceptual_model.png")
```

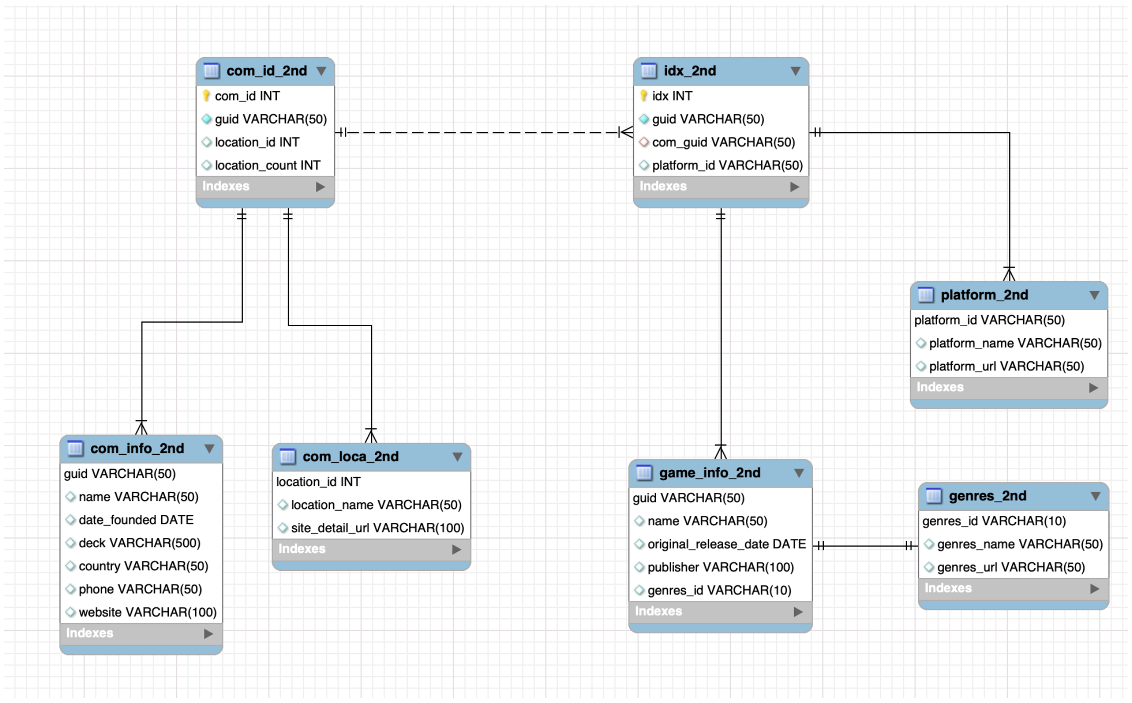
[78]:



1.4 Create Physical schema

[79]:
```
from IPython.display import Image
Image("Physical_model.png")
```

[79]:



1.5 Download data and reformat the data fo fit the conceptual schema.

1.5.1 Import libraries

[24]:
```
import urllib
import requests
import json
import csv
import pymysql
import pandas as pd
```

1.5.2 Step 1: Fetch Video Game Company Information

Connect to MySql server at localhost, and create the table.

[ ]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
cursor = db.cursor()
cursor.execute("DROP TABLE IF EXISTS company")
sql = '''
    CREATE TABLE company(
    guid VARCHAR(50) NOT NULL,
    name VARCHAR(50),
    date_founded DATE,
    deck VARCHAR(500),
    country VARCHAR(50),
    phone VARCHAR(50),
    website VARCHAR(100),
    location_id INT,
    location_name VARCHAR(50),
    site_detail_url VARCHAR(100),
    location_count INT
    )
'''
cursor.execute(sql)
```

Download companies list using API

[88]:
```
user_agent = 'Mozilla/4.0 (compatible; MSIE 5.5; Windows NT)'
headers = {'User-Agent':user_agent,}
url = 'http://www.giantbomb.com/api/companies/?
 ↪api_key=75a93f4b071b6002e1f328293149fb3cd166b91a&format=json&limit=50'
req = urllib.request.Request(url=url, headers=headers)
json_obj = urllib.request.urlopen(req)
data = json.load(json_obj)
show = str(data['results'][0])
print(show[:1000]+'...')
```

```
{'abbreviation': None, 'aliases': 'EA\r\nElectronic Arts Inc.',
'api_detail_url': 'https://www.giantbomb.com/api/company/3010-1/', 'date_added':
'2008-04-01 01:32:48', 'date_founded': '1982-05-28 00:00:00',
'date_last_updated': '2016-06-27 22:31:41', 'deck': 'EA is one of the largest
publisher/developers in the video game industry.', 'description':
'<h2>Overview</h2><p>Electronic Arts is an American developer, publisher,
marketer and distributor and is one of the largest video game companies in the
world. <a data-ref-id="3040-18128" href="/trip-hawkins/3040-18128/">Trip
Hawkins</a> founded the company in 1982 and was a pioneer in <a href="#"
rel="nofollow">the video game</a> industry. When originally formed, EA was a
publishing house, but slowly began to develop in-house games such as <a data-
ref-id="3030-8819" href="/skate-or-die/3030-8819/">Skate or Die</a>. EA then
began to purchase various developers, quickly becoming one of the largest
publishers in the industry.</p><h2>History</h…
```

List the companies returned:

[89]:
```
for i in data['results']:
    print(i['name'])
```

```
Electronic Arts
The Hit Squad
Gremlin Interactive Ltd.
Delete
Domark Software
Telegames, Inc.
Software Storm, Inc.
```

```
Alawar Entertainment, Inc.
Kernel Kaput
The Software Toolworks
Software Country
Dro Soft
Simon & Schuster Interactive
Hypnotix, Inc.
THQ
Yuke's Co. Ltd.
Ariolasoft UK
Dinamic Software
SUNSOFT
Tokai Engineering
Halycon Media GmbH & Co. KG
ChessBase GmbH
Viva Media, LLC
Mindscape Entertainment
Centron Software, Inc.
Progressive Peripherals and Software
Whiptail Interactive
Pixel Studio
Akella
Dinamic Multimedia
n-Space, Inc.
Strategic Simulations, Inc.
Designer Software
dtp entertainment AG
Radon Labs GmbH
Agetec, Inc.
Max Design GesMBH
Shrapnel Games, Inc.
Tiny Hero Game Studios
Fox Interactive
Hyperbole Studios
Sony Interactive Entertainment Europe
ReadySoft Incorporated
Philips Interactive Media, Inc.
Don Bluth Ltd.
Digital Leisure Inc.
Positech Computing Ltd.
Deep Silver
Pluto 13 GmbH
JoWooD Productions Software AG
```

Get detailed company information and games they developed.

[23]:
```
for i in data['results']:
    url_c = 'http://www.giantbomb.com/api/company/'+ str(i['guid'])+'/?
↪api_key=75a93f4b071b6002e1f328293149fb3cd166b91a&format=json'
    req_c = urllib.request.Request(url=url_c, headers=headers)
    json_obj_c = urllib.request.urlopen(req_c)
    data_c = json.load(json_obj_c)
    res = data_c['results']
  ␣
↪print(res['guid'],res['name'],res['date_founded'],res['location_country'],res['phone'],res[
↪5])
    break
```

```
3010-1 Electronic Arts 1982-05-28 00:00:00 USA 650-628-1500 http://www.ea.com
[{'api_detail_url': 'https://www.giantbomb.com/api/game/3030-75845/', 'id':
75845, 'name': 'Battlefield (2021)', 'site_detail_url':
'https://www.giantbomb.com/battlefield-2021/3030-75845/'}, {'api_detail_url':
'https://www.giantbomb.com/api/game/3030-66000/', 'id': 66000, 'name': 'Star
Wars Jedi: Fallen Order', 'site_detail_url': 'https://www.giantbomb.com/star-
wars-jedi-fallen-order/3030-66000/'}, {'api_detail_url':
'https://www.giantbomb.com/api/game/3030-73586/', 'id': 73586, 'name': 'Need for
Speed Heat', 'site_detail_url': 'https://www.giantbomb.com/need-for-speed-
heat/3030-73586/'}, {'api_detail_url':
'https://www.giantbomb.com/api/game/3030-75048/', 'id': 75048, 'name': 'Plants
vs. Zombies: Battle for Neighborville', 'site_detail_url':
'https://www.giantbomb.com/plants-vs-zombies-battle-for-
neighborville/3030-75048/'}, {'api_detail_url':
'https://www.giantbomb.com/api/game/3030-73601/', 'id': 73601, 'name': 'FIFA
20', 'site_detail_url': 'https://www.giantbomb.com/fifa-20/3030-73601/'}]
```

Save published games into csv file for getting detailed game info later.

```
[ ]: for game in res['published_games'][1:5]:
         save = game['api_detail_url'],game['name'],res['guid'],res['name']
         print(save)
         with open('game.csv', 'a')as r:
             r_csv = csv.writer(r)
             r_csv.writerow(save)
```

Load company information into MySql Server. Since the `locations' is a multi-value attribute, we have to dupilicate rows and keep `locations' atomic, to make the table satisfies the requirement of 1st NF.

```
[ ]: try:
         for location in res['locations']:
             sql = '''
             INSERT INTO company(
             guid, name, date_founded, deck, country, phone, website, location_id,␣
↪location_name, site_detail_url, location_count
```

```
        )
        VALUES('%s','%s','%s','%s','%s','%s','%s','%s','%s','%s','%s')'''\
          % (res['guid'], res['name'], res['date_founded'], res['deck'],␣
↪res['location_country'], res['phone'],res['website'],
           location['id'], location['name'], location['site_detail_url'],␣
↪location['count'])


        cursor.execute(sql)
        db.commit()
except:
    print('error')

db.close()
```

[91]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM company"

company_df=pd.read_sql(sql,db)
db.close()
company_df.head()
```

[91]:
```
   idx    guid              name date_founded  \
0    1  3010-1  Electronic Arts   1982-05-28
1    2  3010-1  Electronic Arts   1982-05-28
2    3  3010-1  Electronic Arts   1982-05-28
3    4  3010-1  Electronic Arts   1982-05-28
4    5  3010-1  Electronic Arts   1982-05-28

                                                deck country         phone  \
0  EA is one of the largest publisher/developers …     USA  650-628-1500
1  EA is one of the largest publisher/developers …     USA  650-628-1500
2  EA is one of the largest publisher/developers …     USA  650-628-1500
3  EA is one of the largest publisher/developers …     USA  650-628-1500
4  EA is one of the largest publisher/developers …     USA  650-628-1500

             website  location_id                 location_name  \
0  http://www.ea.com          109                 New York City
1  http://www.ea.com         4263                          Ohio
2  http://www.ea.com          396  The United States of America
3  http://www.ea.com          293                       Chicago
4  http://www.ea.com         3656                      New York

                                   site_detail_url  location_count
0  https://www.giantbomb.com/new-york-city/3035-109/              71
1          https://www.giantbomb.com/ohio/3035-4263/              65
2  https://www.giantbomb.com/the-united-states-of…             65
```

```
3        https://www.giantbomb.com/chicago/3035-293/              58
4      https://www.giantbomb.com/new-york/3035-3656/              57
```

1.5.3 Step2: Get detailed game information.

Connect to MySql Server and create the table

```
[ ]: db = pymysql.connect('localhost','root','mysql9299','game')
     cursor = db.cursor()
     cursor.execute("DROP TABLE IF EXISTS gamelist")
     sql = '''
         CREATE TABLE gamelist(
         guid VARCHAR(50) NOT NULL,
         name VARCHAR(50),
         original_release_date DATE,
         com_guid VARCHAR(50),
         publisher VARCHAR(100),
         genres_name VARCHAR(50),
         genres_id VARCHAR(10),
         genres_url VARCHAR(50),
         platform_name VARCHAR(50),
         platform_id VARCHAR(50),
         platform_url VARCHAR(50)
         )
     '''
     cursor.execute(sql)
```

Read the game_url list saved in csv file

```
[ ]: with open('game.csv')as game:
         game_csv = csv.reader(game)
         for rec in game_csv:
             url = rec[0] + '?
      ↪api_key=75a93f4b071b6002e1f328293149fb3cd166b91a&format=json'
```

Get detailed game information

```
[19]: rec = 'https://www.giantbomb.com/api/game/3030-66000/'
      url = rec + '?api_key=75a93f4b071b6002e1f328293149fb3cd166b91a&format=json'
      user_agent = 'Mozilla/4.0 (compatible; MSIE 5.5; Windows NT)'
      headers = {'User-Agent':user_agent,}
      req = urllib.request.Request(url=url, headers=headers)
      json_obj = urllib.request.urlopen(req)
      data = json.load(json_obj)
      g = data['results']
      print(g['guid'],g['name'],g['original_release_date'],g['publishers'][0]['name'],g['genres'][0]
                     i['name'],i['id'],i['api_detail_url'])
```

```
3030-66000 Star Wars Jedi: Fallen Order 2019-11-15 Electronic Arts Action-
Adventure 43 https://www.giantbomb.com/api/genre/3060-43/ Electronic Arts 1
https://www.giantbomb.com/api/company/3010-1/
```

Load the game information into Mysql Server Since the `platforms' is a multi-value attribute, we have to dupilicate rows and keep `platforms' atomic, to make the table satisfies the requirement of 1st NF.

[ ]:
```
try:
    for i in g['platforms']:
    #    row = g['publishers'][0]['name']
        row =␣
 ↪(g['guid'],g['name'],g['original_release_date'],g['publishers'][0]['name'],g['genres'][0]['
       i['name'],i['id'],i['api_detail_url'])
        print(row)
        sql = '''
                INSERT INTO gamelist(
                guid, name, original_release_date, com_guid, publisher,␣
 ↪genres_name, genres_id,
                genres_url, platform_name, platform_id , platform_url
                )
               ␣
 ↪VALUES('%s','%s','%s','%s','%s','%s','%s','%s','%s','%s','%s')'''\
                    %␣
 ↪(g['guid'],g['name'],g['original_release_date'],rec[2],g['publishers'][0]['name'],g['genres
          i['name'],i['id'],i['api_detail_url'])


        cursor.execute(sql)
        db.commit()
except:
    print("error")
db.close()
```

[92]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM gamelist"

gamelist_df=pd.read_sql(sql,db)
db.close()
gamelist_df.head()
```

[92]:
```
   idx        guid                          name original_release_date  \
0    1  3030-66000  Star Wars Jedi: Fallen Order            2019-11-15
1    2  3030-66000  Star Wars Jedi: Fallen Order            2019-11-15
2    3  3030-66000  Star Wars Jedi: Fallen Order            2019-11-15
3    4  3030-73586          Need for Speed Heat            2019-11-08
4    5  3030-73586          Need for Speed Heat            2019-11-08
```

```
  com_guid        publisher       genres_name genres_id  \
0   3010-1  Electronic Arts  Action-Adventure        43
1   3010-1  Electronic Arts  Action-Adventure        43
2   3010-1  Electronic Arts  Action-Adventure        43
3   3010-1  Electronic Arts    Driving/Racing         6
4   3010-1  Electronic Arts    Driving/Racing         6

                                  genres_url  platform_name platform_id  \
0  https://www.giantbomb.com/api/genre/3060-43/             PC          94
1  https://www.giantbomb.com/api/genre/3060-43/       Xbox One         145
2  https://www.giantbomb.com/api/genre/3060-43/  PlayStation 4         146
3   https://www.giantbomb.com/api/genre/3060-6/             PC          94
4   https://www.giantbomb.com/api/genre/3060-6/       Xbox One         145

                                    platform_url
0   https://www.giantbomb.com/api/platform/3045-94/
1  https://www.giantbomb.com/api/platform/3045-145/
2  https://www.giantbomb.com/api/platform/3045-146/
3   https://www.giantbomb.com/api/platform/3045-94/
4  https://www.giantbomb.com/api/platform/3045-145/
```

1.6 Data Review

Check the company info table

[44]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM company"

company_df=pd.read_sql(sql,db)
db.close()
company_df
```

[44]:
```
     idx      guid               name date_founded  \
0      1    3010-1    Electronic Arts   1982-05-28
1      2    3010-1    Electronic Arts   1982-05-28
2      3    3010-1    Electronic Arts   1982-05-28
3      4    3010-1    Electronic Arts   1982-05-28
4      5    3010-1    Electronic Arts   1982-05-28
..   …        …                  …          …
380  381  3010-119  Dimps Corporation   2000-03-06
381  382  3010-119  Dimps Corporation   2000-03-06
382  383  3010-119  Dimps Corporation   2000-03-06
383  384  3010-119  Dimps Corporation   2000-03-06
384  385  3010-119  Dimps Corporation   2000-03-06

                                                deck country          phone  \
0    EA is one of the largest publisher/developers …     USA   650-628-1500
```

```
1    EA is one of the largest publisher/developers …    USA  650-628-1500
2    EA is one of the largest publisher/developers …    USA  650-628-1500
3    EA is one of the largest publisher/developers …    USA  650-628-1500
4    EA is one of the largest publisher/developers …    USA  650-628-1500
..                                                …      …             …
380  An Osaka-based developer founded by former SNK…  Japan          None
381  An Osaka-based developer founded by former SNK…  Japan          None
382  An Osaka-based developer founded by former SNK…  Japan          None
383  An Osaka-based developer founded by former SNK…  Japan          None
384  An Osaka-based developer founded by former SNK…  Japan          None

               website  location_id                  location_name  \
0    http://www.ea.com          109                  New York City
1    http://www.ea.com         4263                           Ohio
2    http://www.ea.com          396  The United States of America
3    http://www.ea.com          293                        Chicago
4    http://www.ea.com         3656                       New York
..                 …            …                              …
380               None          189                         Mobius
381               None           37                          Japan
382               None         4673                     Kame House
383               None          933                          Beach
384               None         4381    Capsule Corp. Headquarters

                                       site_detail_url  location_count
0    https://www.giantbomb.com/new-york-city/3035-109/              71
1            https://www.giantbomb.com/ohio/3035-4263/              65
2    https://www.giantbomb.com/the-united-states-of…              65
3          https://www.giantbomb.com/chicago/3035-293/              58
4        https://www.giantbomb.com/new-york/3035-3656/              57
..                                                 …             …
380         https://www.giantbomb.com/mobius/3035-189/               4
381           https://www.giantbomb.com/japan/3035-37/               4
382    https://www.giantbomb.com/kame-house/3035-4673/               3
383           https://www.giantbomb.com/beach/3035-933/               3
384  https://www.giantbomb.com/capsule-corp-headqua…               3

[385 rows x 12 columns]
```

[53]:
```
company_df['idx'].is_unique
```

[53]:
```
True
```

Check the game information table

[46]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM gamelist"
```

```
gamelist_df=pd.read_sql(sql,db)
db.close()
gamelist_df
```

[46]:
```
     idx        guid                              name original_release_date  \
0      1  3030-66000       Star Wars Jedi: Fallen Order            2019-11-15
1      2  3030-66000       Star Wars Jedi: Fallen Order            2019-11-15
2      3  3030-66000       Star Wars Jedi: Fallen Order            2019-11-15
3      4  3030-73586              Need for Speed Heat            2019-11-08
4      5  3030-73586              Need for Speed Heat            2019-11-08
..   …         …                                 …                   …
318  319  3030-55395                         ATV Mania            2003-07-23
319  320  3030-73550                      Battle Bolts            2019-03-25
320  321  3030-34402  Serious Sam: The Random Encounter            2011-10-24
321  322  3030-34400              Serious Sam: Double D            2011-08-30
322  323  3030-34400              Serious Sam: Double D            2011-08-30

     com_guid          publisher       genres_name genres_id  \
0      3010-1   Electronic Arts  Action-Adventure        43
1      3010-1   Electronic Arts  Action-Adventure        43
2      3010-1   Electronic Arts  Action-Adventure        43
3      3010-1   Electronic Arts    Driving/Racing         6
4      3010-1   Electronic Arts    Driving/Racing         6
..        …                 …                 …       …
318  3010-117      Gotham Games    Driving/Racing         6
319  3010-118      Croteam Ltd.          Strategy         2
320  3010-118  Devolver Digital      Role-Playing         5
321  3010-118  Devolver Digital        Platformer        41
322  3010-118  Devolver Digital        Platformer        41

                                       genres_url         platform_name  \
0    https://www.giantbomb.com/api/genre/3060-43/                    PC
1    https://www.giantbomb.com/api/genre/3060-43/              Xbox One
2    https://www.giantbomb.com/api/genre/3060-43/         PlayStation 4
3     https://www.giantbomb.com/api/genre/3060-6/                    PC
4     https://www.giantbomb.com/api/genre/3060-6/              Xbox One
..                                            …                   …
318   https://www.giantbomb.com/api/genre/3060-6/           PlayStation
319   https://www.giantbomb.com/api/genre/3060-2/                    PC
320   https://www.giantbomb.com/api/genre/3060-5/                    PC
321  https://www.giantbomb.com/api/genre/3060-41/  Xbox 360 Games Store
322  https://www.giantbomb.com/api/genre/3060-41/                    PC

    platform_id                                   platform_url
0            94   https://www.giantbomb.com/api/platform/3045-94/
1           145  https://www.giantbomb.com/api/platform/3045-145/
```

```
2           146  https://www.giantbomb.com/api/platform/3045-146/
3            94   https://www.giantbomb.com/api/platform/3045-94/
4           145  https://www.giantbomb.com/api/platform/3045-145/
..          …                                                   …
318          22   https://www.giantbomb.com/api/platform/3045-22/
319          94   https://www.giantbomb.com/api/platform/3045-94/
320          94   https://www.giantbomb.com/api/platform/3045-94/
321          86   https://www.giantbomb.com/api/platform/3045-86/
322          94   https://www.giantbomb.com/api/platform/3045-94/

[323 rows x 12 columns]
```

[52]:
```
gamelist_df['idx'].is_unique
```

[52]:
```
True
```

Since each table has primary key (idx) to uniquely identify a record, values and in each column are atomic, and no repeating columns store the similar information in the same table, both table satisfy the requirement of 1st normal form.

Reforming into 2nd NF Since game information only related to game_guid, which is partial dependency. Seperate the column: game_guid, game_name, original_release_date, publisher, genres_id into game_info table. Also set game_guid as the primary key.

[ ]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
cursor = db.cursor()
sql = '''
        DROP TABLE IF EXISTS game_info_2nd;
        CREATE TABLE game_info_2nd AS
        SELECT  DISTINCT guid, name, original_release_date, publisher, genres_id
        FROM game.gamelist;
        ALTER TABLE game_info_2nd ADD PRIMARY KEY(guid);
'''
cursor.execute(sql)
db.close()
```

[57]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM game_info_2nd"

gameinfo_df=pd.read_sql(sql,db)
db.close()
gameinfo_df
```

[57]:
```
          guid                          name original_release_date  \
0      3030-10                 The Real Deal 2            1999-12-31
1   3030-10554                          Spider            1997-02-26
```

```
2    3030-10742                M: Alien Paranoia            2000-12-01
3    3030-11011    Dark Sun: Wake of the Ravager            2015-10-27
4    3030-11371              Gex: Enter the Gecko           1998-02-24
..          …                                  …                 …
142    3030-817                     Pure Pinball            2003-05-28
143   3030-8266   Tactical Ops: Assault on Terror           2002-04-24
144   3030-8636         Outlaw Golf: Holiday Golf           2002-12-13
145    3030-898                       Democracy 2           2007-12-07
146   3030-9446        Dominions 3: The Awakening           2006-09-29

                           publisher genres_id
0           Mindscape Entertainment          2
1     BMG Interactive Entertainment          1
2                  Dinamic Multimedia          1
3       Strategic Simulations, Inc.          4
4              Crave Entertainment          1
..                                …        …
142                    XS Games, LLC         30
143        MicroProse Software, Inc.          1
144     Simon & Schuster Interactive          1
145          Positech Computing Ltd.          2
146             Shrapnel Games, Inc.          2

[147 rows x 5 columns]
```

For the same reason, to reformat data to fit the conceptual schema, we have to * 1. Separate genres_id, genres_name and genres_url into genres table, set genres_id as primary key. * 2. Separate platform_id, platform name and platform_url into platform table, and set platform_id as the primary key. * 3. Separate guid, name, date_founded, deck, country, phone, website into company_info table, and set guid as the primary key. * 4. Seperate location_id, location_name, site_detail_url into company location table, and set location id as the primary key.

```
[ ]: db = pymysql.connect('localhost','root','mysql9299','game')
     cursor = db.cursor()
     sql = '''
             CREATE TABLE platform_2nd AS
             SELECT  DISTINCT platform_id, platform_name, platform_url
             FROM game.gamelist;
             ALTER TABLE platform_2nd ADD PRIMARY KEY(platform_id);

             CREATE TABLE genres_2nd AS
             SELECT  DISTINCT genres_id, genres_name, genres_url
             FROM game.gamelist;
             ALTER TABLE genres_2nd ADD PRIMARY KEY(genres_id);
```

```
        CREATE TABLE com_info_2nd AS
        SELECT DISTINCT guid, name, date_founded, deck, country, phone, website
        FROM game.company;
        ALTER TABLE com_info_2nd ADD PRIMARY KEY(guid);

        CREATE TABLE com_loca_2nd AS
        SELECT DISTINCT location_id, location_name, site_detail_url
        FROM game.company;
        ALTER TABLE com_loca_2nd ADD PRIMARY KEY(location_id);
'''
cursor.execute(sql)
db.close()
```

[60]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM platform_2nd"

platform_df=pd.read_sql(sql,db)
db.close()
platform_df.head(10)
```

[60]:
```
  platform_id               platform_name  \
0           1                       Amiga
1         106                     DSiWare
2         108                   FM Towns
3          11                 Amstrad CPC
4         112                 NEC PC-9801
5         116  PlayStation Network (PSP)
6         117                Nintendo 3DS
7         121                        iPad
8         122                       Zeebo
9         123                     Android

                                      platform_url
0    https://www.giantbomb.com/api/platform/3045-1/
1  https://www.giantbomb.com/api/platform/3045-106/
2  https://www.giantbomb.com/api/platform/3045-108/
3   https://www.giantbomb.com/api/platform/3045-11/
4  https://www.giantbomb.com/api/platform/3045-112/
5  https://www.giantbomb.com/api/platform/3045-116/
6  https://www.giantbomb.com/api/platform/3045-117/
7  https://www.giantbomb.com/api/platform/3045-121/
8  https://www.giantbomb.com/api/platform/3045-122/
9  https://www.giantbomb.com/api/platform/3045-123/
```

[63]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM genres_2nd"
```

```
genres_df=pd.read_sql(sql,db)
db.close()
genres_df
```

[63]:

```
    genres_id            genres_name  \
0           1                 Action
1          11                Shooter
2          13              Card Game
3          14      Trivia/Board Game
4          15            Compilation
5          17    Minigame Collection
6          18                 Puzzle
7          19           Music/Rhythm
8           2               Strategy
9          24       Flight Simulator
10         26              Billiards
11         28                   Golf
12          3                 Sports
13         30                Pinball
14         31  Dual-Joystick Shooter
15         32   First-Person Shooter
16          4              Adventure
17         40                 Soccer
18         41             Platformer
19         43       Action-Adventure
20          5           Role-Playing
21          6         Driving/Racing
22          7             Simulation
23          9               Fighting

                                       genres_url
0    https://www.giantbomb.com/api/genre/3060-1/
1   https://www.giantbomb.com/api/genre/3060-11/
2   https://www.giantbomb.com/api/genre/3060-13/
3   https://www.giantbomb.com/api/genre/3060-14/
4   https://www.giantbomb.com/api/genre/3060-15/
5   https://www.giantbomb.com/api/genre/3060-17/
6   https://www.giantbomb.com/api/genre/3060-18/
7   https://www.giantbomb.com/api/genre/3060-19/
8    https://www.giantbomb.com/api/genre/3060-2/
9   https://www.giantbomb.com/api/genre/3060-24/
10  https://www.giantbomb.com/api/genre/3060-26/
11  https://www.giantbomb.com/api/genre/3060-28/
12   https://www.giantbomb.com/api/genre/3060-3/
13  https://www.giantbomb.com/api/genre/3060-30/
14  https://www.giantbomb.com/api/genre/3060-31/
15  https://www.giantbomb.com/api/genre/3060-32/
```

```
16   https://www.giantbomb.com/api/genre/3060-4/
17  https://www.giantbomb.com/api/genre/3060-40/
18  https://www.giantbomb.com/api/genre/3060-41/
19  https://www.giantbomb.com/api/genre/3060-43/
20   https://www.giantbomb.com/api/genre/3060-5/
21   https://www.giantbomb.com/api/genre/3060-6/
22   https://www.giantbomb.com/api/genre/3060-7/
23   https://www.giantbomb.com/api/genre/3060-9/
```

[65]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM com_info_2nd"

cominfo_df=pd.read_sql(sql,db)
db.close()
cominfo_df.head()
```

[65]:
```
       guid                            name date_founded  \
0    3010-1                 Electronic Arts   1982-05-28
1  3010-104                     Square Enix   2003-04-01
2  3010-106            TopWare Interactive   1991-01-01
3  3010-111             Crave Entertainment   1997-01-01
4  3010-113  BMG Interactive Entertainment   1994-01-01

                                                deck         country  \
0  EA is one of the largest publisher/developers …             USA
1  A Japanese video game company that is best kno…           Japan
2  An international developer and publisher of vi…   United States
3  Crave Entertainment was a video game publishin…   United States
4  Was the multimedia and new technologies divisi…  United Kingdom

           phone                           website
0    650-628-1500                  http://www.ea.com
1  81-3-5333-1555     http://www.square-enix.com/
2    707-794-1532         http://www.topware.com/
3    949-219-1199                            None
4            None  http://www.bmginteractive.com/
```

[66]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM com_loca_2nd"

comloca_df=pd.read_sql(sql,db)
db.close()
comloca_df.head()
```

[66]:
```
   location_id         location_name  \
0           10              The Moon
1           14  The Mushroom Kingdom
```

```
2           24                  Hell
3           29  The Forgotten Realms
4           37                 Japan

                                site_detail_url
0        https://www.giantbomb.com/the-moon/3035-10/
1  https://www.giantbomb.com/the-mushroom-kingdom…
2            https://www.giantbomb.com/hell/3035-24/
3  https://www.giantbomb.com/the-forgotten-realms…
4           https://www.giantbomb.com/japan/3035-37/
```

Create join tables to convert many-to-many relationship (game_name and game_platform, company_name and company_location).

```
[ ]: db = pymysql.connect('localhost','root','mysql9299','game')
     cursor = db.cursor()
     sql = '''
             DROP TABLE IF EXISTS idx_2nd;
             CREATE TABLE idx_2nd AS
             SELECT  idx, guid, com_guid, platform_id
             FROM game.gamelist;
             ALTER TABLE idx_2nd ADD PRIMARY KEY(idx);

             CREATE TABLE com_id_2nd AS
             SELECT com_id, guid, location_id, location_count
             FROM game.company;
             ALTER TABLE com_id_2nd ADD PRIMARY KEY(com_id);
     '''
     cursor.execute(sql)
     db.close()
```

```
[69]: db = pymysql.connect('localhost','root','mysql9299','game')
      sql="SELECT * FROM idx_2nd"

      gameid_df=pd.read_sql(sql,db)
      db.close()
      gameid_df
```

```
[69]:      idx         guid  com_guid platform_id
      0      1  3030-66000    3010-1          94
      1      2  3030-66000    3010-1         145
      2      3  3030-66000    3010-1         146
      3      4  3030-73586    3010-1          94
      4      5  3030-73586    3010-1         145
      ..   …          …         …         …
      318  319  3030-55395  3010-117          22
      319  320  3030-73550  3010-118          94
```

```
320  321  3030-34402  3010-118          94
321  322  3030-34400  3010-118          86
322  323  3030-34400  3010-118          94

[323 rows x 4 columns]
```

[68]:
```
db = pymysql.connect('localhost','root','mysql9299','game')
sql="SELECT * FROM com_id_2nd"

comid_df=pd.read_sql(sql,db)
db.close()
comid_df
```

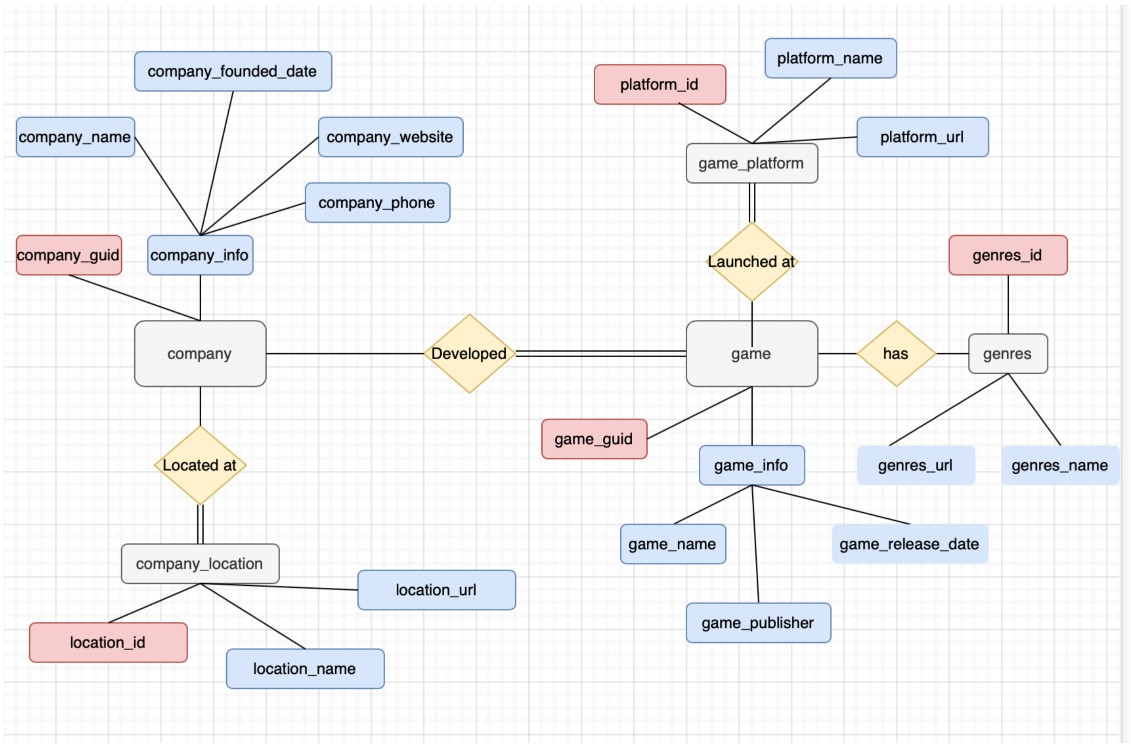
[68]:
```
     com_id      guid  location_id  location_count
0         1    3010-1          109              71
1         2    3010-1         4263              65
2         3    3010-1          396              65
3         4    3010-1          293              58
4         5    3010-1         3656              57
..      …       …            …               …
381     382  3010-119          189               4
382     383  3010-119           37               4
383     384  3010-119         2675               3
384     385  3010-119         4451               3
385     386  3010-119         3884               3

[386 rows x 4 columns]
```

Since there're no partial dependencies exists, all the tables are reformatted into 2nd NF. Also, there're no transitive dependncies, all the tables are satisfied 3rd NF.

1.6.1 UML diagram:

[90]:
```
from IPython.display import Image
Image("UML.png")
```

[90]:



1.6.2 Data Auditting

[51]:
```
gamelist_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 323 entries, 0 to 322
Data columns (total 12 columns):
idx                      323 non-null int64
guid                     323 non-null object
name                     323 non-null object
original_release_date    323 non-null object
com_guid                 323 non-null object
publisher                323 non-null object
genres_name              323 non-null object
genres_id                323 non-null object
genres_url               323 non-null object
platform_name            323 non-null object
platform_id              323 non-null object
platform_url             323 non-null object
dtypes: int64(1), object(11)
memory usage: 30.4+ KB
```

[54]:
```
company_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 385 entries, 0 to 384
Data columns (total 12 columns):
idx                  385 non-null int64
guid                 385 non-null object
name                 385 non-null object
date_founded         385 non-null object
deck                 385 non-null object
country              385 non-null object
phone                385 non-null object
website              385 non-null object
location_id          385 non-null int64
location_name        385 non-null object
site_detail_url      385 non-null object
location_count       385 non-null int64
dtypes: int64(3), object(9)
memory usage: 36.2+ KB
```

There's no null value in the dataset, data cleaning is unnecessary. In real world, the video games has attributes like geners, platforms, etc. What we are collecting contains all the information we needed in the real world, so the dataset is completness. And all the info in the dataset is linked to each other in video game domain, the dataset is consistent.

1.6.3 Qustions:

- 1): What are the ranges, data types and format of all of the attributes in your entities?

[77]:
```
gamelist_df.dtypes, company_df.dtypes
```

[77]:
```
(idx                          int64
 guid                        object
 name                        object
 original_release_date       object
 com_guid                    object
 publisher                   object
 genres_name                 object
 genres_id                   object
 genres_url                  object
 platform_name               object
 platform_id                 object
 platform_url                object
 dtype: object, idx                        int64
 guid                  object
 name                  object
 date_founded          object
 deck                  object
 country           object
 phone             object
 website           object
 location_id        int64
 location_name     object
 site_detail_url   object
 location_count     int64
 dtype: object)
```

- 2): When should you use an entity versus attribute? When we have many attributes that are only related to one attribute specificly (such as game name, game publisher, game company, game geners are all related to game id) we should use an entity instead of attributes.
- 3): When should you use an entity or relationship, and placement of attributes? When there're many attributes only are linked to several attributes (like genres name, genres url are linked to genres id, platform name, platform url are linked to platform id), we should using relationship to link the entitiies (like using relationship to link game id with platform and genres information)
- 4): How did you choose your keys? Which are unique? Keys have to be unique in normal form. We choose game_id as the key of game information, genres_id as the key of genres, platform_id as the key of platform, location_id as the key of company_location, etc.
- 5): Did you model hierarchies using the ``ISA'' design element? Why or why not? No, the entities in our dataset don't have subclasses, the entites don't share same attributes so we don't need ISA hierarchies.
- 6): Were there design alternatives? What are their tradeoffs: entity vs. attribute, entity vs.relationship, binary vs. ternary relationships? In order for populate model in future, we choose geners, platform, company locations to be entities instead of attritbutes
- 7): Where are you going find real-world data populate your model? We have saved the url of detailed information about the attribute, like platform info url, we could use this url to fetch more detailed information in future to populate our model. Also, we would use method like web scrapper to get data from other resources.
- 8): 1. Are all the tables in 1NF? Yes
- 9): Are all the tables in 2NF? Yes
- 10): Are all the tables in 3NF? Yes

1.7 Report

File generated: game.csv Code used: game.py The data of video game information is gathered from giantbomb.com API, both video game company information and video game information are reformatted to satify the requirment of 1st normal form and loaded into tables at Mysql Server. Next using SQL query to reformat the tables to 2nd NF and 3rd NF. In the end, using pandas.read_sql to audit the data to keep the dataset accurate.

1.8 Conclusion

Primary focus of this assignment is to learn how to load the data into 1st NF, and reformat the data into 2nd NF and 3rd NF to fit the conceptual model we create.

1.9 Contribution

We contributed by ourselves: 80% By External source: 20%

1.10 Citations

https://blog.csdn.net/qq_30163461/article/details/80080529
https://blog.csdn.net/u013421629/article/details/77982598
https://www.giantbomb.com/forums/api-developers-3017/

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