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CMPT 475

Artistic Style Platform Project

Homework 2

IT Requirements

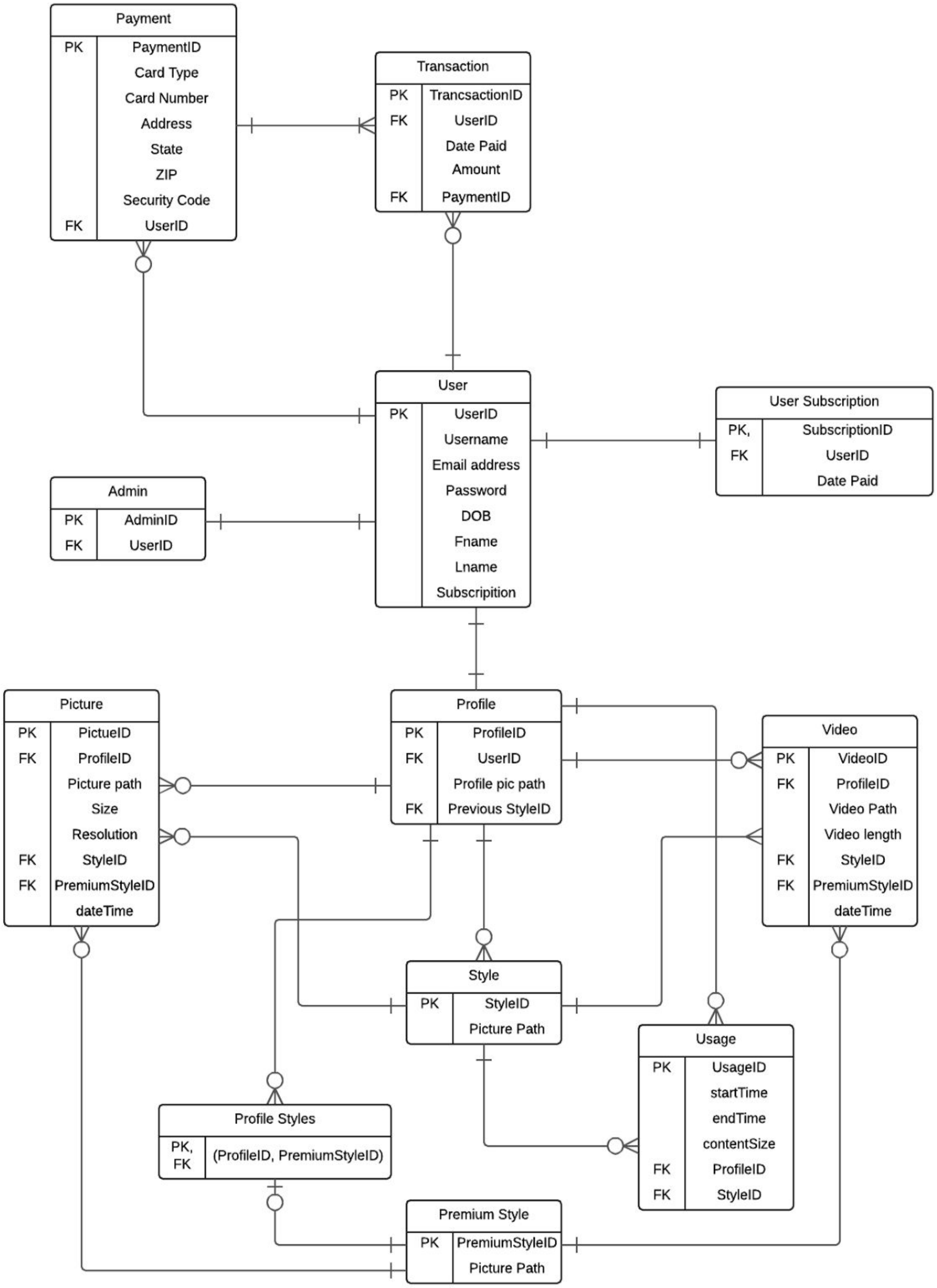
1. Server Platform (for each "server" required)
    1. Database Server Physical system requirements
        1. Storage capacity:
            1. Our database server starting storage capacity for this system is 16Gb. This a reasonable starting size as the database is only storing strings currently.
        2. Speed requirements / response time parameters:
            1. Response from database server should be ~ 1 seconds for every transaction as measured by user request to response.
        3. Scalability plans
            1. As the platform grows ASP will set up distributed farm for it's database server tier. Servers on the database server tier will require fast access for inter-server communication and will present themselves as a single database to the web server tier as database servers will themselves be federated database servers which will address load balancing of the database server tier to manage high volume traffic.
    2. GPU Server Physical system requirements
        1. Storage capacity:
            1. Our GPU server starting storage capacity for this system is 500Gb. This a reasonable starting size as the GPU server will store image data set needed for the model to train.
        2. Speed requirements / response time parameters:
            1. Response from database server should be ~ 3 seconds for every transaction as measured by user request to response. For premium users adding a new style the model will need to retrain with the new style image. Current estimates are that this will take ~ 30 seconds per transaction.[1,2,3]
        3. Scalability plans
            1. As the platform grows ASP will set up distributed farm for it's GPU server tier. Servers on the GPU server tier will require fast access for inter-server communication between machines on GPU server tier and the web server tier. To address scalability we will need to load balance user processes between nodes on the GPU server tier during high volume traffic periods. GPU servers will also be equipped with several high end GPUs.

   3. Web Server Physical system requirements
      1. Storage capacity:
         1. Our Web Server starting storage capacity for this system is 300 Gb. This a reasonable starting size as we will store premium users image and video content on the platform.
      2. Speed requirements / response time parameters:
         1. Response from web server should be ~ 1 seconds for every transaction as measured by user request to response.
      3. Scalability plans
         1. As the platform grows ASP will set up distributed farm for it’s web server tier. Servers on the web server tier will require fast access for inter-server communication and will present themselves as a single entity to the database server tier and the GPU server tier. To address scalability we will need to load balance user processes between nodes on the web server tier during high volume traffic periods.

   4. Virtual system requirements
      1. OS to be supported
         1. Ubuntu 16.04
      2. Number of images expected:
         1. 1 (starting)
   5. Connectivity
      1. Network considerations
         1. There is significant traffic in a server farm across the web server tier and the database server tier therefore the network can easily become a bottleneck under certain conditions like dealing with large files (videos) or high traffic loads. To ensure optimal performance the web server tier and any outward facing server should be equipped with two network interface cards (NICs): one to handle end-user traffic and the other to handle inter-server communication. Network latency between servers should be managed as it can significantly affect performance and is important to maintain < 1 millisecond of network latency between the web server and the database server. Also the web servers, GPU servers, and database servers should be located as close as possible within the server farm. The server farm network should have at least 1 Gbps of bandwidth.
      2. Interconnection to what other systems:
         1. Web server -> Database server; Web server -> GPU server
4. Reliability
   1. Service Level Agreements
      1. uptime requirements
         2. This system is available for the end-user 99.999% (downtime of about 5 minutes/year) of the time. Outages will be scheduled and announced a week before on the platform so that users. Outages will also be planned to not interfere with known high volume periods of use.
      1. Response time requirements
         1. Download: 76.80 Mbps, Upload: 68.92 Mbps
5. Recoverability
   1. Where are things backed up? How often?

        1. Everything is backed up to a back up disk stored on a axillary server and it is backed up every 24 hours. All servers have build scripts to allow for the servers to be recovered.
    2. Access to backups?
        1. Backups can be accessed by platform admins.
    3. What data is transient and doesn't need to be stored longer term?
        1. Transaction data is transient and can be backed up on a weekly basis which in the database will be a save contents of database to csv file then drop and restore the transactions table from create statements.
6. Security and Privacy
    1. Database
        1. Access controls by userid / roles
            1. Database admin can alter database scheme.
        2. Update vs. Access
            1. Database admin can update and access the database scheme.
    2. Account information
        1. User data
            1. Personal / registration
                1. First name, Last name, DOB, email address
            2. Saved course information
                1. First name, Last name, DOB, email address, username, userID, subscriptionID, Plan Name, Plan Description, profileID, ProfilePic, previous sytle, pictureID picture path, picture size, picture original resolution, styleID, videoID, video path, video length, AdminID, TransactionID, DatePaid, Amount
        2. Privacy considerations
            1. This platform's infrastructure and practices have user privacy as a primary concern To protect user information all personally identifiable information is encrypted in compliance with Advanced Encryption Standard (AES).
    3. Admin access controls
        1. Adding new users, deleting old
            1. Platform admins will be able to add new user and delete existing users though the platform admin platform management tools. Admins can also view platform reports and log files. Admins will also be able edit order of queue processes on the platform and see reports of users that get reported for content violations.
7. Maintenance
    1. Planned down time requirements
        1. Database maintenance
            1. Database will be updated when new stable versions of the database are released and widely adopted by technologies used on this platform. Database admin will regularly scan database logs checking for suspicious activity in the database logs. Database will be backed up on a daily basis to a back up disk on auxiliary server.
        2. Updated platform information
            1. Platform will be updated every 3 months as part of it's regularly scheduled maintenance.
        3. Times of year when IT does maintenance
            1. IT staff will perform evaluations for of the platform technology on a monthly basis and will perform scheduled maintained every 3 months.
        4. Times of year when the systems are not available?
            1. Scheduled maintained will occur every 3 months.

ER Diagram


Payment
PK PaymentID
Card Type
Card Number
Address
State
ZIP
Security Code
FK UserID
Transaction
PK TrancsactionID
FK UserID
Date Paid
Amount
FK PaymentID
User
PK UserID
Username
Email address
Password
DOB
Fname
Lname
Subscripition
User Subscription
PK, FK SubscriptionID
UserID
Date Paid
Admin
PK AdminID
FK UserID
Picture
PK PictueID
FK ProfileID
Picture path
Size
Resolution
FK StyleID
FK PremiumStyleID
dateTime
Profile
PK ProfileID
FK UserID
Profile pic path
FK Previous StyleID
Video
PK VideoID
FK ProfileID
Video Path
Video length
FK StyleID
FK PremiumStyleID
dateTime
Style
PK StyleID
Picture Path
Usage
PK UsageID
startTime
endTime
contentSize
FK ProfileID
FK StyleID
Profile Styles
PK, FK (ProfileID, PremiumStyleID)
Premium Style
PK PremiumStyleID
Picture Path

ER Diagram Documentation

"Admin"

- The primary key is AdminID because this specifies the specific id for the Admin.
- The foreign key is UserID which allows the user information to be referenced in the User table.
- There is a one-to-one relationship with User because only one user account can be associated with an admin account

"User"

- The primary key is UserID because this specifies the specific id for the user.
- The attributes are Email address, Password, Date of birth, First name and Last name.
- There is a one-to-one relationship with Admin because a single user can only be one admin user
- There is a one-to-one relationship with User Subscription because a user can have one subscription.
- There is a one-to-zero or more relationship with Transaction because a user can have zero or more transactions.
- There is a one-to-zero or more relationship with Payment because a user can have one or zero payment methods
- There is a one-to-one relationship with Profile because a user can only have a single profile.

"Profile"

- The primary key is ProfileID because this specifies the id of the different user accounts.
- UserID is a foreign key to the User table.
- Previous StyleID is a foreign key the Style table.
- The attribute is Profile picture path which is the path to the location of the profile picture.
- There is a one-to-one relationship with User because one profile is given to one user.
- There is a one-to-zero or more relationship with Picture because a profile can have zero or more pictures.
- There is a one-to-zero or more relationship with Video because a profile can have zero or more videos.
- There is a one-to-zero or more relationship with Profile Styles because a profile can have zero or more uploaded styles.
- There is a one-to-zero or more relationship with Style because a profile can use zero or more styles
- There is a one-to-zero or more relationship with the Usage table because one profile can have zero or more usages of the system.

"Picture"

- The primary key is PictureID because this specifies the specific id for the pictures.

- ProfileID is a foreign key to the Profile table so that each photo is associated with a profile.
- StyleID is a foreign key to the Style table so that we will know what style is being used to style a photo.
- PremiumStyleID is a foreign key to the Style table so that we will know if a photo is being styled with an uploaded style
- The attributes are Picture path which is the path to the location of the picture and Size which is how much memory it takes up.
- There is a zero or more-to-one relationship with the Profile table because a zero or more photos can be attributed to a single profile.
- There is a zero or more-to-one relationship with the Style table because zero or more pictures could have used a style.
- There is zero or more-to-one relationship with the Premium Style table because zero or more pictures could have used an uploaded style

“Video”

- The primary key is VideoID because this specifies the specific id for the videos.
- ProfileID is a foreign key to the Profile table so that each video is associated with a profile.
- StyleID is a foreign key to the Style table so that we will know what style is being used to style a video.
- PremiumStyleID is a foreign key to the Style table so that we will know if a photo is being styled with an uploaded style
- The attributes are Video path which is the path to the location of the video and Video length which is the length of a video in seconds.
- There is a zero or more-to-one relationship with the Profile table because zero or more videos can be attributed to a single profile.
- There is a zero or more-to-one relationship with the Style table because zero or more videos could have used a style.
- There is zero or more-to-one relationship with the Premium Style table because zero or more pictures could have used an uploaded style

“Profile Styles”

- The primary key is a composite key made up of StyleID and ProfileID because a premium user can upload many styles.
- ProfileID is the foreign key to the Profile table.
- PremiumStyleID is the foreign key the Premium Style table.
- There is a zero or more-to-one relationship with Profile because zero or more styles can be uploaded by a premium profile.
- There is a zero-to-one relationship with the Premium Style table because a style being used by a profile will have one entry in the Premium Style table

“Style”

- The primary key is StyleID because this specifies the specific id for the styles.
- The attribute is Picture Path
- There is a one-to-zero or more relationship with the Picture and Video tables because a style can be used on zero or more photos or videos.
- There is a zero or more-to-one relationship with the Profile table because a zero or more profiles can be used by a profile
- There is a one-to-zero or more relationship with the Usage table because a style can have zero or more usages

“Premium Style”

- The primary key is PremiumStyleID because this specifies the specific id for premium styles.
- The attribute Picture Path
- There is zero-to-one relationship with the Premium Styles table because an uploaded style will be used on one profile.
- There is one-to-zero or more relationship with the Photos table and Videos table because an uploaded style can be used on zero or more photos or videos

“User Subscription”

- The primary key is SubscriptionID because this specifies the specific id for the user’s subscription.
- UserID is the foreign key to the User table.
- There is a zero or more-to-one relationship with User because zero or multiple subscriptions can be attributed to a User.
- The attribute is Date Paid which is the date they signed up for a subscripition.

“Payment”

- The primary key is PaymentID because this specifies the specific id for the payments and payment methods.
- UserID is foreign key to the User Table.
- The attributes are Card Type, Card Number, Address, State, Zip, and Security Code.
- There is a one-to-zero or more relationship with the User table because zero or more payment methods are specific to one user.
- There is a one-to-one or more relationship with Transaction because a payment method can be used for one or more transactions.

“Transaction”

- The primary key is TransactionID because this specifies the specific id for the transactions.
- UserID is a foreign key to the User table.
- PaymentID is a foreign key to the Payment table.
- The attributes are Date Paid and Amount .
- There is a zero or more-to-one relationship with User because zero or more transactions can be completed by a user.
- There is a one or more-to-one relationship with Payment because one or more transactions can have the same payment method.

“Usage”

- The primary key is UsageID because it specifies the specific id for each usage of the system
- ProfileID is a foreign key to the Profile table.
- StyleID is a foreign key to the Style table.
- The attributes are startTime, endTime, and contentSize.
- There is a zero or more-to-one relationship with the Style table because zero or more usages can be attributed to one style.
- There is a zero or more-to-one relationship with the Profile table because zero more usages can be attributed to one style

References

1) Chen, Tian Qi, Schmidt, Mark. Fast Patch-based Style Transfer of Arbitrary Style https://arxiv.org/abs/1612.04337
2) Dumoulin, Vincent. A Learned Representation For Artistic Style

   https://arxiv.org/abs/1610.07629
3) Huang, Haozhi. Real-Time Neural Style Transfer for Videos http://openaccess.thecvf.com/content_cvpr_2017/papers/Huang_Real-Time_Neural_Style_CVPR_2017_paper.pdf