FRÓÐSKAPARSETUR FØROYA

Vælkomin til

Kjakið

Verkætlan í Linux Systems

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Forum forrit við MariaDB

Ubuntu Server VM/Ansible stýring

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1 Problemformulering

Hvussu ger man eina kjak heimasíðu sum fólk kunnu vitja og stovna tráðir og leggja innlegg í? Og møguliga eisini hava møguleika at deila media har?

- Man má gera sær greitt at har má vera ein heimasíða, sum fólk vitja.
- Á hesari heimasíðuni skal brúkarin kunna síggja kjaksíður.
  - Fara inn á eina kjak undirsíðu.
  - Síggja tráðir og kunna stovna tráðir.
  - Kunna fara inn á einkultar tráðir og svara í einum tráði og viðmerkja navn, tekstsvar og um tey vilja leggja mynd avtrat.

2 Tólmenni

Ein Ubuntu Server við einari lokalari heimasíðu og brúkt ein MariaDB dátagrunn at goyma tráðirnir og postar í. PhpMyAdmin verður brúkt til at síggja dátagrunnin og tað er installera á sjálva servaran, men er ikki partur av Ansible playbook, tí tað er ikki neyðugt fyri at fáa kjak heimasíðuna at virka.

3 Mál / Framgangsháttur

Vit byrja við einari stutta analysu hvussu hetta skal fremjast.

- Arkitektur bygnaða av probleminum og hvussu tað fer at síggja út.
- Gera ein databasa í MariaDB har man kann stovna ein *thread* í 3 ymiskum kjakforum har fólk kunna svara uppá.
- Við einum fullfíggjaðum MariaDB datagrunn byggja eina heimasíðu sum virkar sum eitt *interface* millum heimasíðuna og datagrunnin.
- *Business logic* millumlið verður brúkt PHP til samskifting millum heimasíðuna og MariaDB.
- Millumliðið fer at avgera hvussu úrslit frá datagrunninum verður víst.

4 Design

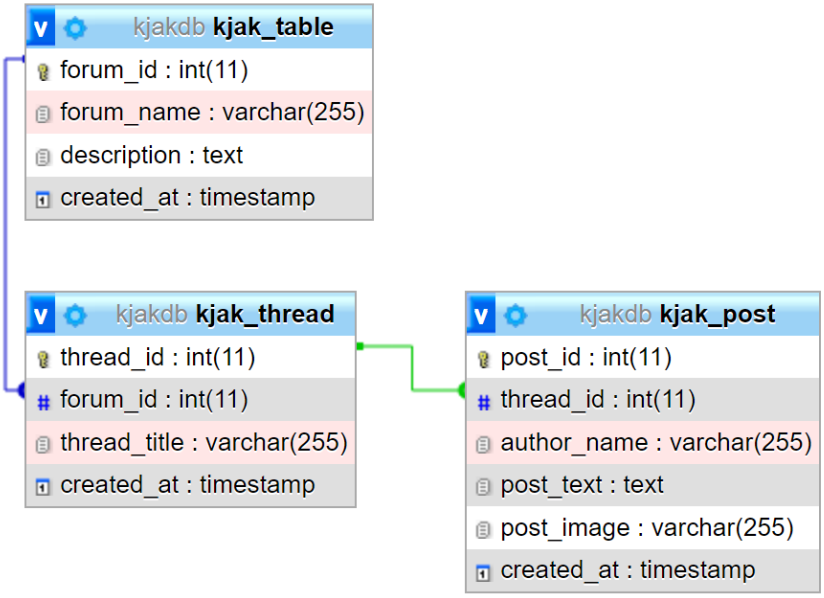


Figure 1: Databasa relatiónirnar fyri *kjakdb*

Databasa relatiónirnar vísa hvussu tær 3 tabelirnar eru relatarar. **kjak_table** er høvuðs tabellin og hevur *Primary Key* forum_id til *Foreign Key* til **kjak_thread**, og **kjak_thread** hevur *Primary Key* thread_id til *Foreign Key* til **kjak_post**.

Heimasíðan er bert 4 síður við embeddaða PHP kodu til at vísa dáta frá *kjakdb* dátagrunnins 3 tabellir. Annars er ein CSS fíl *style.css* fyri uppseting og ein *conn.php* við íbinding upplýsingarnar til dátagrunnin. Tær 4 síðurnar eru:

- *index.php* Heimasíðan sum vísur forumini.
- *view_forum.php* Undirsíðan fyri at vísa tráðir fyri eitt forum.
- *view_thread.php* Undirsíðan fyri at vísa ein á tráð og allar svør í tí tráðinum.
- *create_thread.php* Fyri at stovna ein nýggjan tráð.

Hesar 6 fílar (og eisini 7nda *favicon.ico* fílin) verða stovnaðir av at koyra kommandoina á einari VM við *Ansible*:

ansible-pull -U https://github.com/salomonvjoensen/linuxskipanir.git

Tað ekskeverarar eina *Ansible* Playbook **local.yml** á hasum repository sum ger her hesu trin idempotentli (t.v.s. kann vera endurtikið uttan at bróta uppá nakað ella gera óneyðug kopiir):

- Installerar Apache2, startar Apache2.
- Ger eina *uploads* mappu í */var/www/html/uploads*
- Tær 7 fílir kopieraðar yvir til *html* mappuna.
- **MariaDB** tænasta verður stovna og byrja.
- **Pip** og **PyMySQL** verða installera.
- Stovna *kjakdb* dátagrunnin.
- Stovna *kjak_user* brúkaran fyri dátagrunnin.
- Koyra SQL script á dátagrunnin fyri at gera tær neyðugu tabellirnar.
- Til seinast koyra eitt *bash* script til at dagføra dátagrunnin.

Aftaná kann man opna localhost í ein kagara og Kjak heimasíðan er uppi og koyrir.

5 Tíðarætlan

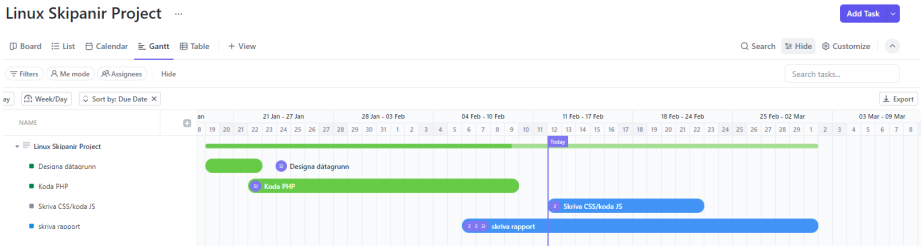


Figure 2: Skermmynd tikin av tíðarætlan mánadagin 12. februar 2024

6 Appendix

PDF-eksportside

Indholdsfortegnelse

PDF-eksportside

1 kjak_post

Oprettelse: 07. 02 2024 kl. 21:40:43
Seneste opdatering: 09. 02 2024 kl. 12:49:27

Kolonne	Datatype	Attributter	Nulværdi	Standardværdi	Ekstra	Linker til	Kommentarer	MIME
post_id	int(11)		Nej		auto_increment			
thread_id	int(11)		Ja	NULL		-> kjak_thread.thread_id ON UPDATE RESTRICT ON DELETE CASCADE		
author_name	varchar(255)		Ja	NULL				
post_text	text		Nej					
post_image	varchar(255)		Ja	NULL				
created_at	timestamp		Nej	current_timestamp()				

2 kjak_table

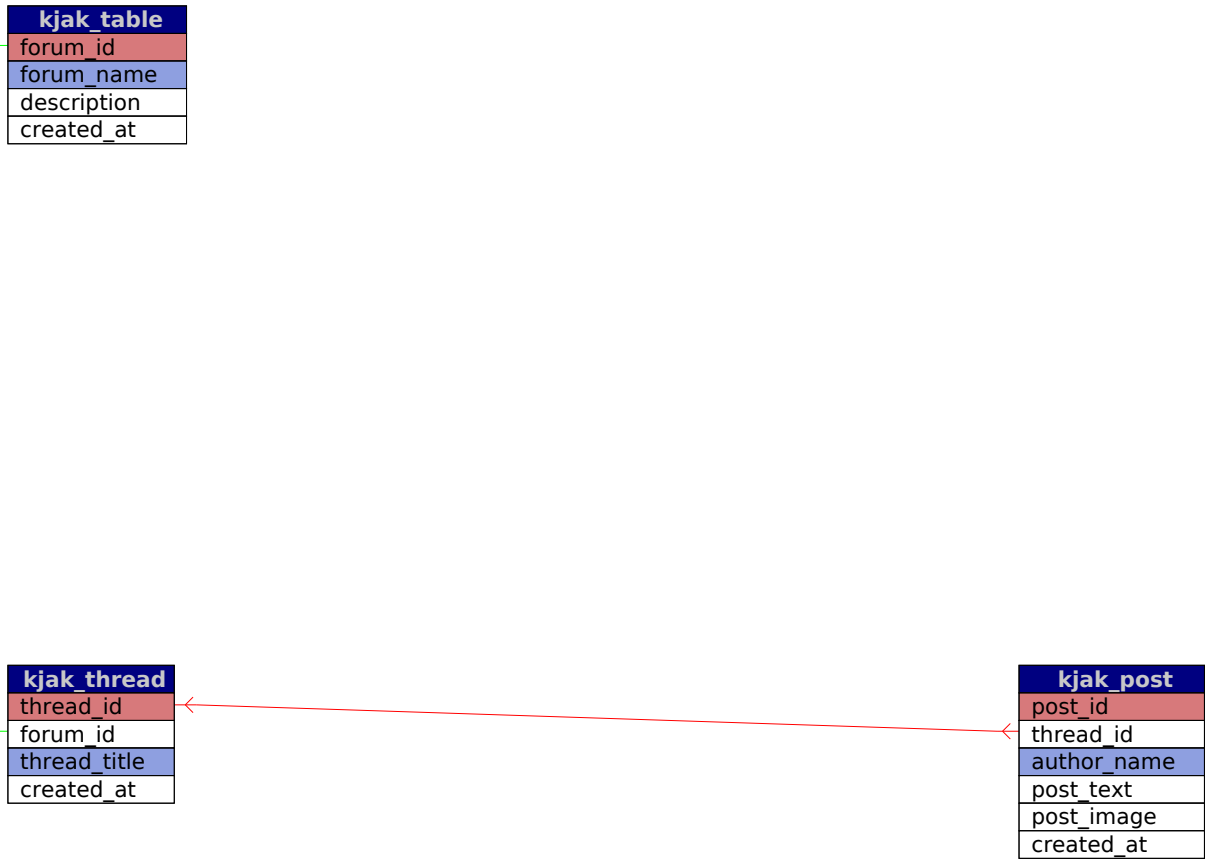
Oprettelse: 07. 02 2024 kl. 21:40:43

Kolonne	Datatype	Attributter	Nulværdi	Standardværdi	Ekstra	Linker til	Kommentarer	MIME
forum_id	int(11)		Nej		auto_increment			
forum_name	varchar(255)		Nej					
description	text		Ja	NULL				
created_at	timestamp		Nej	current_timestamp()				

3 kjak_thread

Oprettelse: 07. 02 2024 kl. 21:40:43
Seneste opdatering: 09. 02 2024 kl. 12:42:52

Kolonne	Datatype	Attributter	Nulværdi	Standardværdi	Ekstra	Linker til	Kommentarer	MIME
thread_id	int(11)		Nej		auto_increment			
forum_id	int(11)		Ja	NULL		-> kjak_table.forum_id ON UPDATE RESTRICT ON DELETE CASCADE		
thread_title	varchar(255)		Nej					
created_at	timestamp		Nej	current_timestamp()				


kjak_table
forum_id
forum_name
description
created_at
kjak_thread
thread_id
forum_id
thread_title
created_at
kjak_post
post_id
thread_id
author_name
post_text
post_image
created_at

Local.yml

```yaml
---
- hosts: localhost
  become: yes
  tasks:
    - name: Install Apache
      ansible.builtin.apt:
        name: apache2
        state: present
    - name: Start the apache2 services
      ansible.builtin.service:
        name: apache2
        state: started
        enabled: true

    - name: Create uploads folder
      ansible.builtin.file:
        path: /var/www/html/uploads
        state: directory
        owner: root
        group: root
        mode: '0777'

    - name: Copy index.php
      ansible.builtin.copy:
        src: www/index.php
        dest: /var/www/html/index.php

    - name: Copy favicon.ico
      ansible.builtin.copy:
        src: www/favicon.ico
        dest: /var/www/html/favicon.ico

    - name: Copy style.css
      ansible.builtin.copy:
        src: www/style.css
        dest: /var/www/html/style.css

    - name: Copy conn.php
      ansible.builtin.copy:
        src: www/conn.php
        dest: /var/www/html/conn.php

    - name: Copy create_thread.php
      ansible.builtin.copy:
        src: www/create_thread.php
        dest: /var/www/html/create_thread.php

    - name: Copy view_forum.php
```

Local.yml

```
    ansible.builtin.copy:
      src: www/view_forum.php
      dest: /var/www/html/view_forum.php

  - name: Copy view_thread.php
    ansible.builtin.copy:
      src: www/view_thread.php
      dest: /var/www/html/view_thread.php

  - name: Install MariaDB server
    ansible.builtin.apt:
      name: mariadb-server
      state: present

  - name: Start and enable MariaDB service
    ansible.builtin.service:
      name: mariadb
      state: started
      enabled: true

  - name: Ensure pip is installed
    ansible.builtin.apt:
      name: python3-pip
      state: present

  - name: Install PyMySQL
    ansible.builtin.pip:
      name: PyMySQL
      state: present

  - name: Create .my.cnf for MySQL authentication
    ansible.builtin.copy:
      dest: "~/.my.cnf"
      content: |
        [client]
        user=root
        password=kjak2kjak
      mode: '0600'
    become: yes

  - name: Set root password for MySQL/MariaDB
    ansible.builtin.mysql_user:
      name: root
      password: kjak2kjak
      login_user: root
      check_implicit_admin: yes
      host_all: yes
```

Local.yml

```yaml
- name: Ensure the database 'kjakdb' exists
  ansible.builtin.mysql_db:
    name: kjakdb
    state: present
    login_user: root
    login_password: kjak2kjak

- name: Ensure the kjakdb user exists with privileges
  ansible.builtin.mysql_user:
    name: kjak_user
    password: kjak2kjak
    priv: 'kjakdb.*:ALL'
    state: present
    login_user: root
    login_password: kjak2kjak

- name: Copy SQL script to target machine
  ansible.builtin.copy:
    src: sql/kjakdb.sql
    dest: /tmp/kjakdb.sql

- name: Import SQL script into kjakdb database
  ansible.builtin.mysql_db:
    name: kjakdb
    state: import
    target: /tmp/kjakdb.sql
    login_user: root
    login_password: kjak2kjak

- name: Copy check and update script on kjakdb
  ansible.builtin.copy:
    src: sh/update_kjakdb.sh
    dest: /tmp/update_kjakdb.sh
    mode: '0755'

- name: Execute the update script on kjakdb
  ansible.builtin.command:
    cmd: /tmp/update_kjakdb.sh
```

Kjakdb.sql

```
-- phpMyAdmin SQL Dump
-- version 5.1.1deb5ubuntu1
-- https://www.phpmyadmin.net/
--
-- Host: localhost:3306
-- Generation Time: Feb 04, 2024 at 08:27 PM
-- Server version: 10.6.16-MariaDB-0ubuntu0.22.04.1
-- PHP Version: 8.1.2-1ubuntu2.14

SET SQL_MODE = "NO_AUTO_VALUE_ON_ZERO";
--START TRANSACTION;
SET time_zone = "+00:00";


/*!40101 SET @OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT */;
/*!40101 SET @OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS */;
/*!40101 SET @OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;
/*!40101 SET NAMES utf8mb4 */;

--
-- Database: `kjakdb`
--

-- --------------------------------------------------------

--
-- Table structure for table `kjak_post`
--

CREATE TABLE IF NOT EXISTS `kjak_post` (
  `post_id` int(11) NOT NULL,
  `thread_id` int(11) DEFAULT NULL,
  `author_name` varchar(255) DEFAULT NULL,
  `post_text` text NOT NULL,
  `post_image` varchar(255) DEFAULT NULL,
  `created_at` timestamp NOT NULL DEFAULT current_timestamp()
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

-- --------------------------------------------------------

--
-- Table structure for table `kjak_table`
--

CREATE TABLE IF NOT EXISTS `kjak_table` (
  `forum_id` int(11) NOT NULL,
  `forum_name` varchar(255) NOT NULL,
  `description` text DEFAULT NULL,
  `created_at` timestamp NOT NULL DEFAULT current_timestamp()
```

Kjakdb.sql

```
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

-- --------------------------------------------------------

--
-- Table structure for table `kjak_thread`
--

CREATE TABLE IF NOT EXISTS `kjak_thread` (
  `thread_id` int(11) NOT NULL,
  `forum_id` int(11) DEFAULT NULL,
  `thread_title` varchar(255) NOT NULL,
  `created_at` timestamp NOT NULL DEFAULT current_timestamp()
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

-- --------------------------------------------------------
--
-- Indexes for table `kjak_post`
--
--ALTER TABLE `kjak_post`
--  ADD PRIMARY KEY (`post_id`),
--  ADD KEY `thread_id` (`thread_id`);

--
-- Indexes for table `kjak_table`
--
--ALTER TABLE `kjak_table`
--  ADD PRIMARY KEY (`forum_id`);

--
-- Indexes for table `kjak_thread`
--
--ALTER TABLE `kjak_thread`
--  ADD PRIMARY KEY (`thread_id`),
--  ADD KEY `forum_id` (`forum_id`);

-- --------------------------------------------------------

--
-- AUTO_INCREMENT for dumped tables
--

--
-- AUTO_INCREMENT for table `kjak_post`
--
--ALTER TABLE `kjak_post`
--  MODIFY `post_id` int(11) NOT NULL AUTO_INCREMENT;
```

Kjakdb.sql

```
--
-- AUTO_INCREMENT for table `kjak_table`
--
--ALTER TABLE `kjak_table`
--  MODIFY `forum_id` int(11) NOT NULL AUTO_INCREMENT;

--
-- AUTO_INCREMENT for table `kjak_thread`
--
--ALTER TABLE `kjak_thread`
--  MODIFY `thread_id` int(11) NOT NULL AUTO_INCREMENT;

--
-- Constraints for dumped tables
--


--
-- Constraints for table `kjak_post`
--
--ALTER TABLE `kjak_post`
--  ADD CONSTRAINT `kjak_post_ibfk_1` FOREIGN KEY (`thread_id`) REFERENCES
`kjak_thread` (`thread_id`) ON DELETE CASCADE;

--
-- Constraints for table `kjak_thread`
--
--ALTER TABLE `kjak_thread`
--  ADD CONSTRAINT `kjak_thread_ibfk_1` FOREIGN KEY (`forum_id`) REFERENCES
`kjak_table` (`forum_id`) ON DELETE CASCADE;

-- --------------------------------------------------------


--
-- The 3 tuples that will be inserted in to the Forum.
--

INSERT INTO `kjak_table` (`forum_name`, `description`)
SELECT * FROM (SELECT 'Tíðindir', 'Hvat nýtt veitst tú?') AS tmp
WHERE NOT EXISTS (
  SELECT `forum_name` FROM `kjak_table` WHERE `forum_name` = 'Tíðindir'
) LIMIT 1;

INSERT INTO `kjak_table` (`forum_name`, `description`)
SELECT * FROM (SELECT 'Kjak', 'Kjak um hvat sum helst.') AS tmp
WHERE NOT EXISTS (
  SELECT `forum_name` FROM `kjak_table` WHERE `forum_name` = 'Kjak'
) LIMIT 1;
```

Kjakdb.sql

```
INSERT INTO `kjak_table` (`forum_name`, `description`)
SELECT * FROM (SELECT 'Áhugi', 'Lat heimin vita um tíni áhugamál.') AS tmp
WHERE NOT EXISTS (
  SELECT `forum_name` FROM `kjak_table` WHERE `forum_name` = 'Áhugi'
) LIMIT 1;
--COMMIT;

/*!40101 SET CHARACTER_SET_CLIENT=@OLD_CHARACTER_SET_CLIENT */;
/*!40101 SET CHARACTER_SET_RESULTS=@OLD_CHARACTER_SET_RESULTS */;
/*!40101 SET COLLATION_CONNECTION=@OLD_COLLATION_CONNECTION */;
```

Update_kjakdb.sh

```
#!/bin/bash

DATABASE='kjakdb'
MYSQL_ROOT_USER='root'
MYSQL_ROOT_PASSWORD='kjak2kjak'
ANON_USER='anon'
ANON_PASSWORD='anonbrúkari'

# Function to check if user exists and create if not
ensure_user_exists() {
  local user=$1
  local password=$2

  echo "Checking if user $user exists..."
  if ! mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -e "SELECT 1 FROM
mysql.user WHERE user = '$user'" | grep -q 1; then
    echo "User $user does not exist, creating..."
    mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -e "CREATE USER
'$user'@'localhost' IDENTIFIED BY '$password';"
  else
    echo "User $user already exists."
  fi
}

# Grant permissions to user
grant_permissions() {
  local user=$1
  local database=$2
  local table=$3
  local privileges=$4

  echo "Granting $privileges privileges to $user on $database..."
  mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -e "GRANT $privileges
ON $database.$table TO '$user'@'localhost';"
  mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -e "FLUSH PRIVILEGES;"
}

# Function to check and add primary keys and indexes
add_primary_key_and_index() {
  local table=$1
  local primary_key=$2
  local index_columns=$3

  echo "Checking primary key for table $table..."
  if ! mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -
sse "SHOW KEYS FROM $table WHERE Key_name = 'PRIMARY';" | grep -q 'PRIMARY';
then
    echo "Adding primary key ($primary_key) to $table..."
```

Update_kjakdb.sh

```
    mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -e
"ALTER TABLE $table ADD PRIMARY KEY ($primary_key);"
  else
    echo "Primary key ($primary_key) already exists in $table."
  fi

  if [[ -n "$index_columns" ]]; then
    for index_column in ${index_columns//,/ }; do
      echo "Checking index for column $index_column in $table..."
      if ! mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE"
-sse "SHOW INDEX FROM $table WHERE Column_name = '$index_column';" | grep -q
"$index_column"; then
        echo "Adding index for column $index_column in $table..."
        mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -e
"ALTER TABLE $table ADD INDEX ($index_column);"
      else
        echo "Index for column $index_column already exists in $table."
      fi
    done
  fi
}

# Function to check and add foreign keys
add_foreign_key() {
  local table=$1
  local constraint_name=$2
  local foreign_key=$3
  local references=$4

  echo "Checking foreign key $constraint_name in table $table..."
  if ! mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -
sse "SELECT CONSTRAINT_NAME FROM information_schema.TABLE_CONSTRAINTS WHERE
CONSTRAINT_SCHEMA = '$DATABASE' AND TABLE_NAME = '$table' AND CONSTRAINT_NAME
= '$constraint_name';" | grep -q "$constraint_name"; then
    echo "Adding foreign key $constraint_name to $table..."
    mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -e
"ALTER TABLE $table ADD CONSTRAINT $constraint_name FOREIGN KEY ($foreign_key)
REFERENCES $references;"
  else
    echo "Foreign key $constraint_name already exists in $table."
  fi
}

# Function to set AUTO_INCREMENT
set_auto_increment() {
  local table=$1
  local column=$2
```

Update_kjakdb.sh

```
  echo "Setting AUTO_INCREMENT for $column in $table..."
  mysql -u "$MYSQL_ROOT_USER" -p"$MYSQL_ROOT_PASSWORD" -D "$DATABASE" -e
"ALTER TABLE $table MODIFY $column int(11) NOT NULL AUTO_INCREMENT;"
}

# Ensure 'anon' user exists and grant permissions
ensure_user_exists "$ANON_USER" "$ANON_PASSWORD"
grant_permissions "$ANON_USER" "$DATABASE" "*" "SELECT"
grant_permissions "$ANON_USER" "$DATABASE" "kjak_thread" "INSERT, UPDATE"
grant_permissions "$ANON_USER" "$DATABASE" "kjak_post" "INSERT, UPDATE"

# Add primary keys, indexes, and set auto-increment
add_primary_key_and_index 'kjak_post' 'post_id' 'thread_id'
add_primary_key_and_index 'kjak_table' 'forum_id'
add_primary_key_and_index 'kjak_thread' 'thread_id' 'forum_id'

set_auto_increment 'kjak_post' 'post_id'
set_auto_increment 'kjak_table' 'forum_id'
set_auto_increment 'kjak_thread' 'thread_id'

# Add foreign keys
add_foreign_key 'kjak_post' 'kjak_post_ibfk_1' 'thread_id'
'kjak_thread(thread_id)'
add_foreign_key 'kjak_thread' 'kjak_thread_ibfk_1' 'forum_id'
'kjak_table(forum_id)'
```