E-Learning SQL System Documentation

Purpose

This SQL Server-based e-learning platform provides structured management and analytics features for users including learners, instructors, and admins. It supports course enrollment, progress tracking, evaluations, feedback, certification, support handling, and backup routines.

1 Database Overview

```
CREATE DATABASE E_Learning;
USE E_Learning;
```

2 Schemas & Tables

users_schema:
- learners: Personal data & registration details.
- instructors: Instructor credentials & qualifications.
- admins: Admin users with roles (superadmin, supportadmin, contentadmin).

course_schema:
- course: Course metadata and instructor linkage.
- course_content: Different types of content linked to courses (video, pdf, quiz, text).

enrollment_schema:
- enrollment: Tracks learner's course enrollment and progress.

evaluation:
- quizze: Quizzes per course.
- quizzequestions: Questions under each quiz.
- answers: Learner-submitted answers and correctness.

feedback_schema:
- feedback: Ratings and comments on courses.

certification_schema:
- certification: Tracks certification after course completion.

support_schema:
- support: Learner issues and admin responses.

3 Views

- popular_category: Enrollments by category.
- course_enrollments: Enrollments by course.
- no_certification: Learners without certification.
- no_enrollments_course: Courses without any enrollment.
- content_popular: Most frequent content type.

4 Functions

- course_rating(@coursename): Returns average course rating.
- avg_progress(@coursename): Returns average learner progress in a course.
- learner_info(@id): Returns progress & certifications of a learner across courses.

5 Stored Procedures

- pop_course(@category_name): Top-rated courses per category.
- pop_country: Most active countries by enrollment.
- top_learner: Top-performing learners by quiz scores.
- Amount_of_progress(@percent): Learners completing X% or more.
- top_instructors: Instructors ranked by average course feedback.
- category_feedback: Avg feedback rating by category.

6 Triggers

- auto_update_course: Updates created_at timestamp on course changes.
- trg_Log_Course_Enrollments: Logs every enrollment to a separate table.

7 Indexes

- Enrollment_Log_id: Clustered index on Enrollment_Log.learner_id.
- enrollment_progress: Nonclustered index on enrollment progress for faster analysis.

8 Advanced Features

 Analytics:
- Pivot tables for country-based learner distribution and number of courses per category.
- Ranking of learners by total quiz score.
- Historical learner progress tracking using LAG & LEAD.

 Cursors & Merges:
- Cursor-based learner status updater (not started, in progress, almost complete).

- MERGE-based status update for performance optimization.

9 Backups

```
-- Full Backup
BACKUP DATABASE [E_Learning] TO DISK = 'D:\backups e learning.bak' WITH FORMAT;


-- Differential Backup
BACKUP DATABASE [E_Learning] TO DISK = 'D:\backups e learning.bak' WITH DIFFERENTIAL;


-- Log Backup
BACKUP LOG [E_Learning] TO DISK = 'D:\backups e learning\E_Learning_LOG.trn';
```

Suggested Enhancements

- Add completion_date to enrollment for tracking when learners finish.
- Log feedback timestamps in more detail for trending analysis.
- Create dashboard views or reports for real-time monitoring.
- Add foreign key constraint to Enrollment_Log if required.
- Add soft deletes via is_deleted flags instead of hard deletes.