SkillForge - Class Diagram

User
- userID: int
- username: String
- email: String
- password: String

Student (Extends User)
+ browseCourses(Course []): void
+ enrollCourse(Course): boolean
+ completeLesson(Lesson): void
+ completeQuiz(quizID: int): int
+ earnCertificate(Course): void

Instructor (Extends User)
+ createCourse(): Course
+ manageCourse(Course): void
+ uploadLesson(Lesson): void
+ createQuiz(): Quiz

Admin (Extends User)
+ manageUser(User): void
+ approveCourse(Course): void
+ removeCourse(Course): void
+ viewAnalytics(): void

JsonDatabaseManager
- users: User[]
- courses: Course[]
- certificates: Certificate[]
- studentAnalytics: Analytics[]

+ readFromFile(): void
+ saveToFile(): void
+ returnUsers(): User[]
+ returnCourses(): Course[]
+ returnCertificates(): Certificate[]
+ returnAnalytics(): Analytics[]
+ saveUsers(): void
+ saveCourses(): void
+ saveCertificates(): void
+ saveAnalytics(): void

Certificate
- certificateID: int
- courseID: int
- instructorID: int
- instructorName: String
- studentID: int
- studentName: String
- grade: int
- issueDate: LocalDate

+ showCertificate(): void

Analytics
- completedCourses: Course[]
- timeSpent: float
- quizGrades: int[]

+ updateAnalytics(): void
+ returnTime(): int
+ returnCompletedCourses(): Course[]
+ returnGrades(): int[]

UserService
- dbManager: JsonDatabaseManager

+ createUser(userID: int,
            username: String,
            email: String,
            password: String,): boolean
+ loginUser(email: String, password: String): User
+ logoutUser(): void

+ updateUser(userID: int,
            newUsername: String,
            newEmail: String): boolean
+ changePassword(userID: int,
            oldPassword: String,
            newPassword: String): boolean
+ deleteUser(userID: int): boolean

+ getUser(userID: int): User
+ returnAllUsers(): User[]

CourseService
- dbManager: JsonDatabaseManager

+ createCourse(instructorID: int,
            title: String,
            desc: String): Course
+ enrollStudent(studentID: int, courseID: int): boolean

+ getAvailableCourses(): Course[]
+ getCourse(courseID: int): Course

+ updateCourse(courseID: int,
            title: String,
            desc: String): boolean
+ deleteCourse(courseID: int): boolean

+ getCourseProgress(studentID: int, courseID: int): double
+ isCourseCompleted(studentID: int, courseID: int): boolean

+ addLessonToCourse(courseID: int,
            lesson: Lesson): boolean
+ addQuizToCourse(courseID: int, quizID: int): boolean

+ issueCertificateUponCompletion(studentID: int,
            courseID: int): Certificate
+ getStudentCertificates(studentID: int): Certificate[]
+ revokeCertificate(certificateID: int): boolean

QuizService
- dbManager: JsonDatabaseManager

+ createQuiz(questions: Question[],
            courseID: int,
            lessonID: int): Quiz
+ addQuestion(quizID: int, Question): boolean
+ removeQuestion(quizID: int,
            questionID: int): boolean
+ deleteQuiz(Quiz): boolean
+ takeQuiz(studentID: int,
            quizID: int): float
+ getQuiz(quizID: int): Quiz
+ isQuizPass(studentID: int, quizID: int): boolean
+ setPassingGrade(quizID: int, grade: float): void

Course
- courseID: int
- courseTitle: String
- courseDesc: String
- courseProgress: double

+ displayInfo(): void
+ updateProgress(): void
+ issueCertificate(): Certificate

Lesson
- lessonID: int
- lessonTitle: String
- lessonContent: String[]
- optionalResources: String[]

+ displayLesson(): void

Quiz
- quizID: int
- questions: Question[]
- passingGrade: float

+ evaluate(): int

Question
- questionID: int
- questionText: String
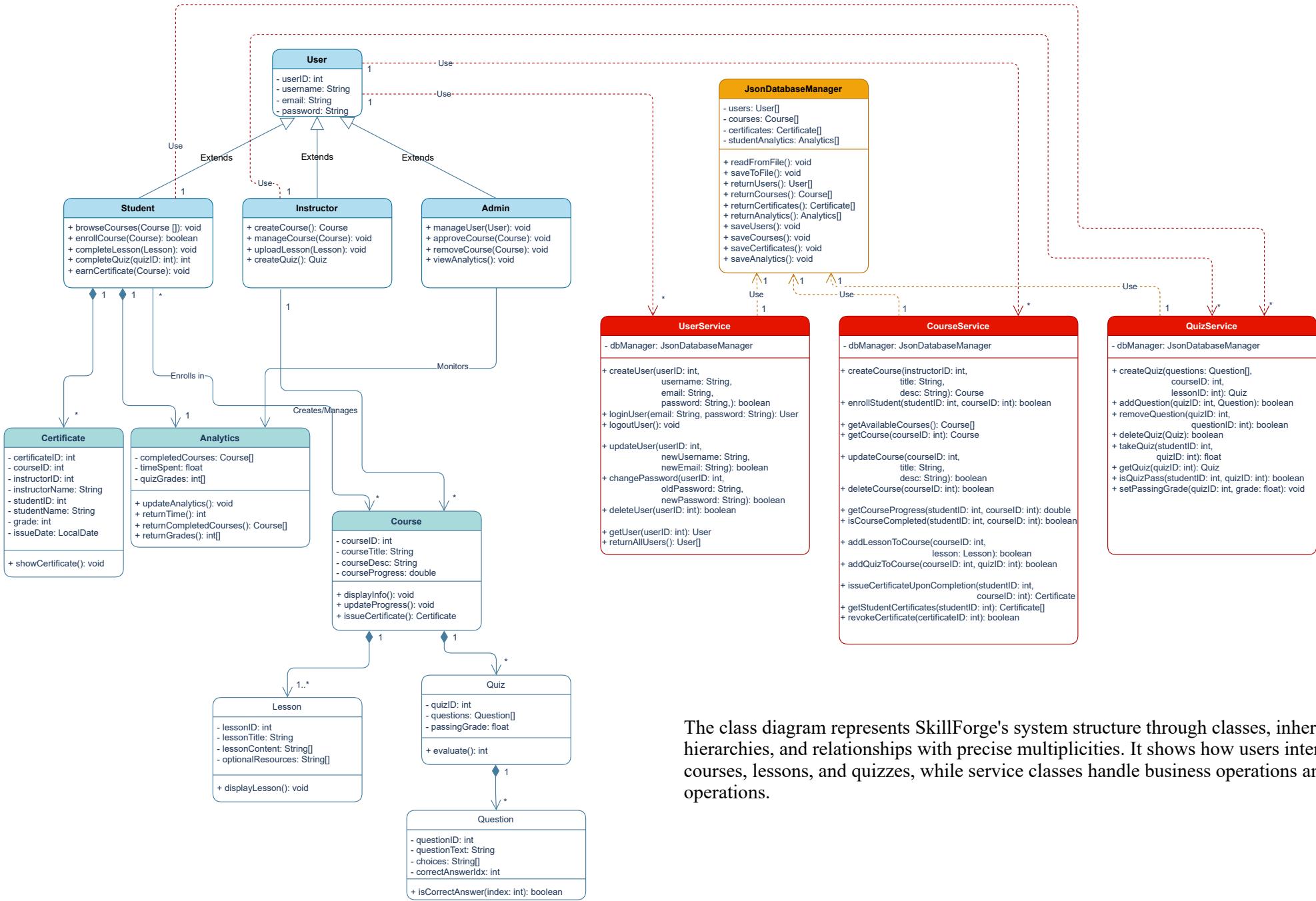- choices: String[]
- correctAnswerIdx: int

+ isCorrectAnswer(index: int): boolean

The class diagram represents SkillForge's system structure through classes, inheritance hierarchies, and relationships with precise multiplicities. It shows how users interact with courses, lessons, and quizzes, while service classes handle business operations and data files operations.