**Report on Skills Gained from Developing the .NET C# Application**

**Introduction**

Developing this .NET C# application has provided valuable hands-on experience in multiple domains, including backend development, database management, text extraction, and API development. This report outlines the technical skills and knowledge gained throughout the project.

**Key Skills Acquired**

**1. ASP.NET Core and Web API Development**

* Implemented RESTful APIs using ASP.NET Core MVC.
* Designed and developed endpoints for file upload and data extraction.
* Utilized IFormFile to handle file uploads within API controllers.

**2. Entity Framework Core (EF Core) and Database Management**

* Designed and implemented a relational database using EF Core.
* Established entity relationships, including one-to-many associations between Invoice and Flight entities.
* Used migrations to apply schema changes efficiently.
* Enforced data integrity with unique constraints on invoice and flight records.

**3. PDF Text Extraction with iText7**

* Extracted structured data from PDF documents using PdfTextExtractor.
* Parsed multi-page PDF documents efficiently.
* Implemented regular expressions for structured data extraction.

**4. Regex and Data Extraction**

* Used advanced regular expressions to extract invoice details, including GSTN ID, PAN, invoice number, and flight details.
* Designed robust regex patterns to accommodate variations in invoice formats.
* Implemented logic to handle single and multiple field extractions.

**5. Error Handling and Debugging**

* Implemented exception handling using try-catch blocks.
* Provided meaningful error messages and stack traces for debugging.
* Managed potential edge cases, such as missing or malformed data.

**6. Dependency Injection and Service Integration**

* Utilized dependency injection for AppDbContext to ensure efficient database interactions.
* Leveraged [FromServices] attribute for cleaner service injection within controllers.

**7. Data Validation and Business Logic Implementation**

* Ensured data integrity by validating extracted fields before inserting them into the database.
* Enforced constraints such as unique invoice numbers and flight details.
* Implemented logic to parse and convert extracted values into appropriate data types.

**8. Asynchronous Programming with Async/Await**

* Used async/await patterns to handle file processing and database operations.
* Ensured non-blocking execution for better performance.

**Challenges Faced and Solutions Implemented**

* **Handling Variations in PDF Formats**: Designed flexible regex patterns to accommodate different invoice layouts.
* **Efficient Database Transactions**: Used SaveChangesAsync() strategically to optimize database writes.
* **Error Handling in File Uploads**: Implemented checks for file null values and improper formats to prevent processing failures.

**Conclusion**

This project provided an in-depth understanding of building a robust backend system with .NET Core. The experience gained in API development, database management, PDF text extraction, and regex-based parsing significantly enhanced technical expertise. These skills are highly transferable to various domains, including financial applications, document processing systems, and enterprise software solutions.