# Milestone Four – Emerging Technologies Journal Entry

## Part One – Journal Entry

### 1. Identification and Description of Each Technology

Technology 1 – Artificial Intelligence (AI) and Machine Learning (ML)  
AI and ML have revolutionized the way software processes data, learns patterns, and makes predictions without explicit programming for every scenario. This technology powers recommendation systems, fraud detection, autonomous vehicles, language models, and image recognition. AI/ML systems use algorithms and massive datasets to improve over time, enabling increasingly accurate results in diverse domains.  
  
Technology 2 – Cloud Computing and Serverless Architectures  
Cloud computing enables on-demand access to computing power, storage, and services via the internet. Platforms like AWS, Azure, and Google Cloud have made it possible for organizations to scale applications globally without heavy infrastructure investments. Serverless architectures take this further by abstracting server management entirely—developers only write code while the cloud provider handles provisioning, scaling, and maintenance.

### 2. Likely Impacts on Computer Science or My Career

AI/ML Impact:  
In my career, integrating AI into software solutions will become increasingly essential. It can enhance applications with smarter decision-making, natural language processing, and automation. As a software developer, gaining proficiency in AI frameworks like TensorFlow, PyTorch, or cloud AI services will allow me to create more advanced and competitive solutions.  
  
Cloud Computing Impact:  
Proficiency in cloud platforms will be critical for deploying and maintaining scalable, secure, and cost-effective systems. My experience with backend APIs, databases, and modular architecture will benefit greatly from leveraging serverless designs and cloud-native patterns, making applications more resilient and faster to develop.

### 3. Impacts on Humans, Communities, or the World

AI/ML:  
AI enables healthcare diagnostics, accessibility tools for people with disabilities, and disaster prediction models that can save lives. However, it also raises ethical concerns like bias in algorithms, privacy violations, and the displacement of certain jobs, requiring careful governance.  
  
Cloud Computing:  
Cloud services have democratized access to powerful computing resources, enabling startups, small businesses, and nonprofits to build globally available applications without huge budgets. This accessibility fosters innovation but also creates dependencies on large cloud vendors, raising data sovereignty and long-term cost concerns.

### 4. Course Outcomes Achieved and Remaining

So far, I have met these outcomes:  
- Design and develop professional-quality software by enhancing backend controllers, integrating middleware, and implementing best practices in modular architecture.  
- Design and evaluate computing solutions by adding efficient pagination logic and filtering to API calls, improving user experience and performance.  
- Use well-founded and innovative techniques through database audit plugins, soft delete logic, and enhanced schema design.  
  
Remaining outcomes:  
- Apply security-focused design principles across all components.  
- Fully integrate cloud deployment strategies for the application as part of scalability and reliability goals.

## Part Two – Status Checkpoints Table

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| --- | --- | --- | --- |
| Checkpoint | Software Design and Engineering | Algorithms and Data Structures | Databases |
| Name of Artifact Used | Travlr Getaways – Refactored app.js, centralized config, middleware, and reusable view rendering helper | Travlr Getaways – Pagination and filtering logic in `travel` controller | Travlr Getaways – Mongoose audit plugin with CreatedAt, UpdatedAt, IsDeleted, DeletedAt, and UpdatedBy fields |
| Status of Initial Enhancement | Completed modularization, replaced var with const/let, and added centralized error handler | Implemented efficient pagination with query parameters and optional filters | Implemented audit plugin for schema tracking and soft delete/restore functionality |
| Submission Status | Submitted for review | Submitted for review | Submitted for review |
| Status of Final Enhancement | Finalized with feedback incorporated | Finalized with performance improvements and better validation | Finalized with helper methods and migration notes |
| Uploaded to ePortfolio | Yes | Yes | Yes |
| Status of Finalized ePortfolio | Ready | Ready | Ready |