

MICHIGAN STATE

U N I V E R S I T Y

Project Plan
Teacher's Virtual Toolbelt
The Capstone Experience

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*From Students...
...to Professionals*

Functional Specifications

- Explore HoloLens as a teaching tool
- Using holograms to better illustrate class concepts (classical mechanics)
- Lesson planning
- Quizzes
- Stream mixed reality view



Design Specifications

- Web Application
 - Simple web forms
 - Lesson planning
 - Course registration
 - Easy to navigate
 - Single page application
 - Live stream cohesive with student chat box
 - Quiz scores
- HoloLens Application
 - Universally used 2D/3D holograms
 - Arrows, spheres, lines, circles
 - Billboard style reference material



Screen Mockup: Web Forms

Teacher's Virtual Toolbelt

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New Lesson

- Add Quiz
- Add Text
- Add Reference Material

Lesson Contents

▼ Type	▼ Title	▼
Quiz	Q1	<input type="checkbox"/>
Text	T1	<input type="checkbox"/>
Reference	R1	<input type="checkbox"/>
Quiz	Q2	<input type="checkbox"/>

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Course Registration

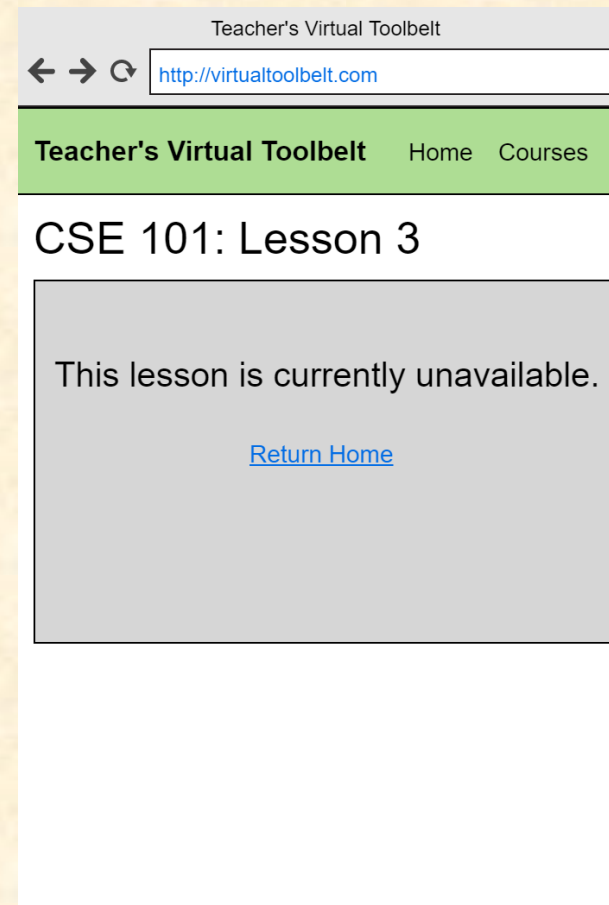
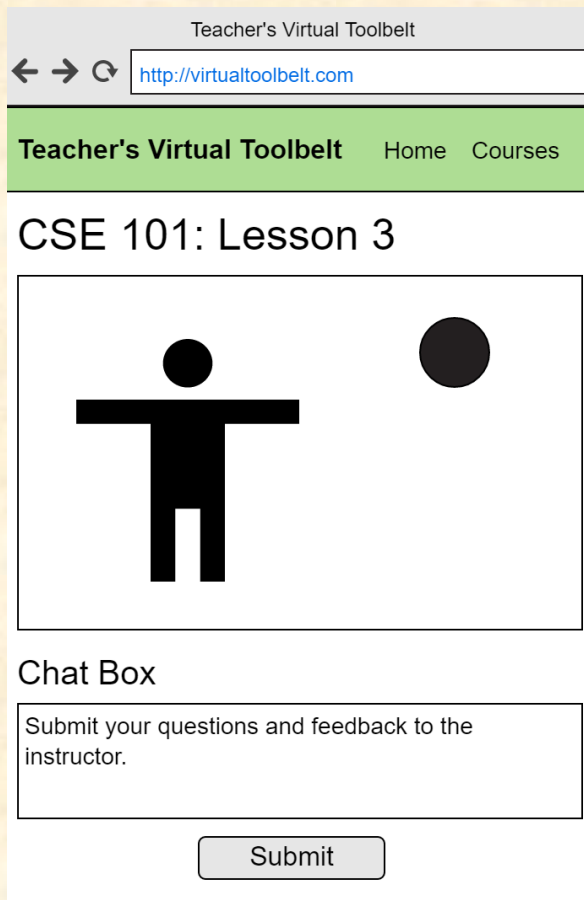
Course Name:

Instructor Name:

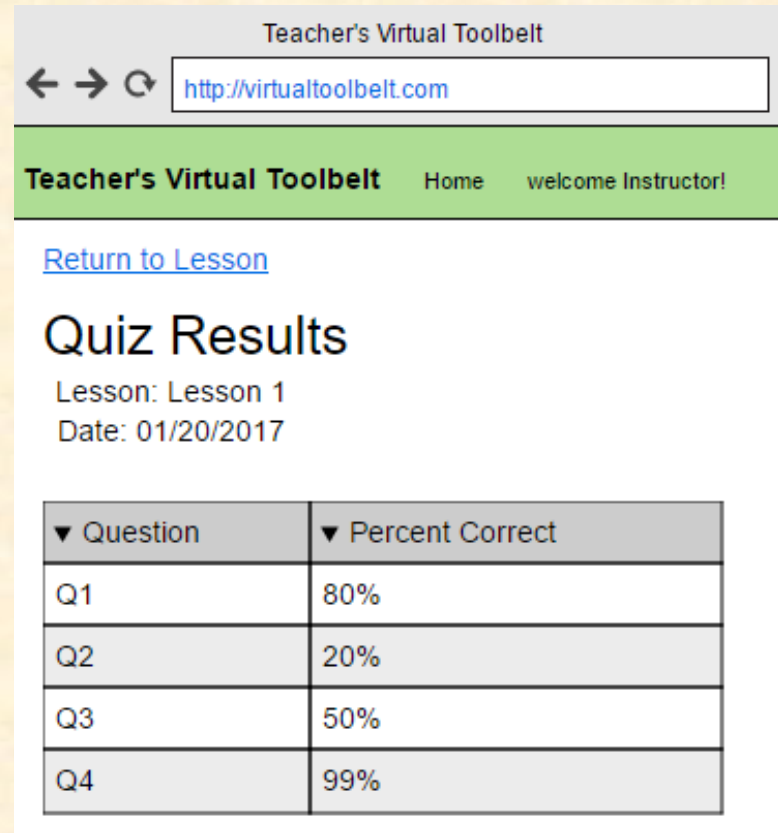
Upon submission, your individual course code will be generated. Students may use this code to enroll in this course.



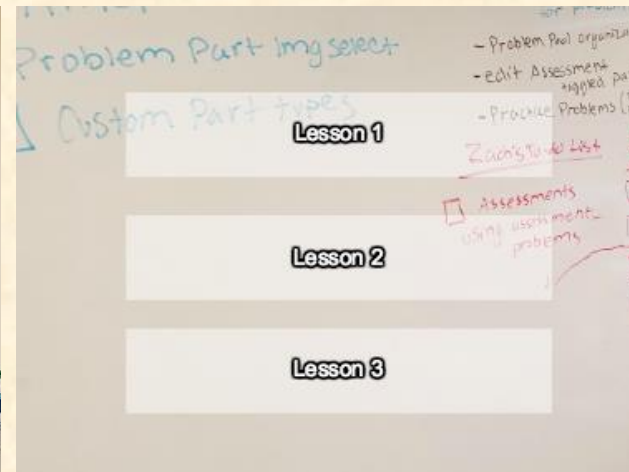
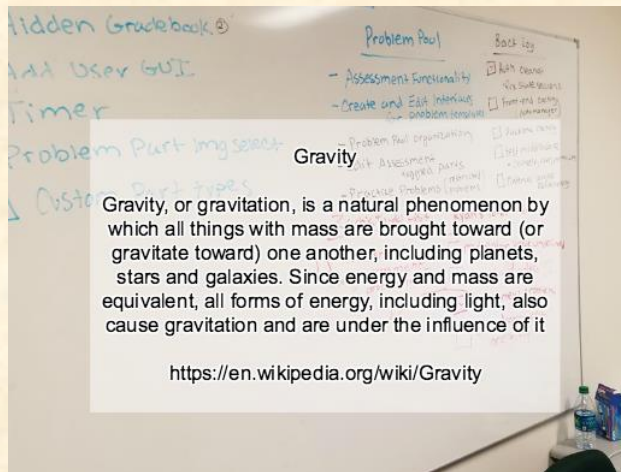
Screen Mockup: Live Lessons



Screen Mockup: Web Application



Screen Mockup: HoloLens



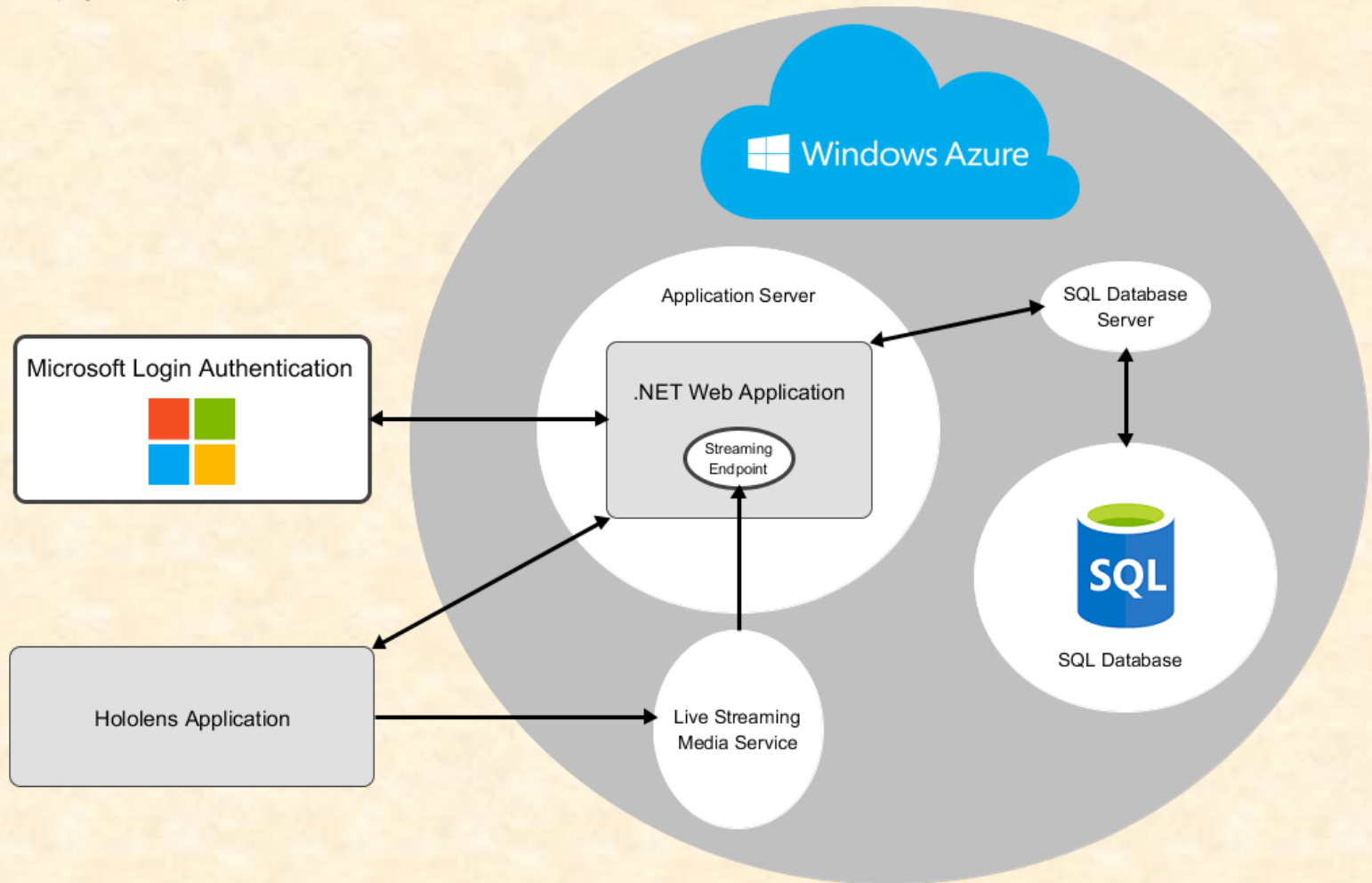
Technical Specifications

- HoloLens Application
 - C#
 - Unity, Visual Studio
- Single Page Web Application
 - AngularJS, HTML, CSS, SQL, C#, ASP.NET Web API
 - Visual Studio
- HoloLens Live Streaming
 - Device API calls (GET .mp4), LowLatencyMRC script
 - FFmpeg, Azure Media Services



System Architecture

Visual Paradigm Standard Edition (Michigan State University)



System Components

- Hardware Platforms
 - Microsoft HoloLens
 - Microsoft Azure
- Software Platforms / Technologies
 - Single Page Web Application
 - ASP.NET Web API
 - Unity C# HoloLens Application
 - Augmented Reality Live Streaming



Testing

- Using Git as version control and to track issues
- New features will..
 - be created on new branches
 - be merged to master branch upon team testing and approval
- Perform user testing at major project milestones



Risks

- HoloLens Development
 - No previous experience
 - HoloLens Academy and Unity tutorials
- Mixed Reality Live Stream
 - Key component with minimal documentation
 - Started immediately, considering alternatives (Live Services, OBS)
- HoloLens and Web Service APIs
 - What is best framework for communication between web application and HoloLens?
 - Research .NET Web API framework, HoloLens HTTP requests
- Reference Material
 - Rendering reference material from the web without an in-app browser
 - Research ways to render HTML pages in Unity, and how to store this data



Questions?

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