



VETS 2 TECH

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ORGANIZATION: INGE MARCUS SCHOOL OF ENGINEERING | SAINT MARTIN'S UNIVERSITY

STAKEHOLDERS



WASHINGTON
VETS2TECH

CLIENT DETAILS:

- Accelerated 16-week program
- Professional development education and training in Computer Science/IT
- Provides three learning pathways:
 - Server Cloud Application
 - Cloud Application Development
 - Cybersecurity Administration

OBJECTIVE:

- Create a web platform that guides students to the best-fit program
- Provide real-time AI-powered support using a 'study buddy'
- Leverage Data Analytics for actionable insights to stakeholders
- Ensure Scalability, Usability, and Security

PURPOSE



PROBLEM:

- Veteran's face challenges in transitioning to tech careers
- Accelerated programs require tailored support and resources.

GOALS:

- Provide guided learning paths and interactive study tools
- Enhance engagement through machine learning and AI-powered support
- Deliver predictive insights to improve outcomes

MEET THE TEAM



BETH GALLATIN

Project Manager
Stakeholder
Communication, Backend



CONNIE RODRIGUEZ

Development
Backend, Frontend



JOHN MCDURMON

Design
UI/UX design

PROJECT CONSTRAINTS

TECHNICAL CONSTRAINTS

- AI Integration Complexity
- Scalability vs. Budget Constraints
- Data Privacy and Security Compliance
- Adaptive Testing Model Development

QUALITATIVE CONSTRAINTS

- User-centric Design
- Cross-platform Compatibility
- Stakeholder Feedback Integration
- Ethical Considerations

ENGINEERING AND COMPUTING PRINCIPLES

- **Modular and Scalable Architecture:**

- Problem Solved: AI Integration Complexity and Scalability vs. Budget Constraints

- **Interface Segregation Principle:**

- Problem Solved: Overloaded Interfaces and Complexity in Code Maintenance

- **Security by Design:**

- Problem Solved: Data Privacy, Unauthorized Access, and Compliance

- **Agile Development and Iterative Feedback Integration:**

- Problem Solved: Stakeholder Feedback Integration and User-Centric Design

DESIGN EXPLORATION AND ALTERNATIVES

FRAMEWORK

- **Django**
- ASP.NET
- React

LANGUAGE

- **Python**
- C#
- JavaScript

QUIZ SYSTEM DESIGN

- **Custom Development**
- Learning Management System
- Open-source Quiz Libraries

DATA ANALYTICS

- **R**
- Python
- Tableau

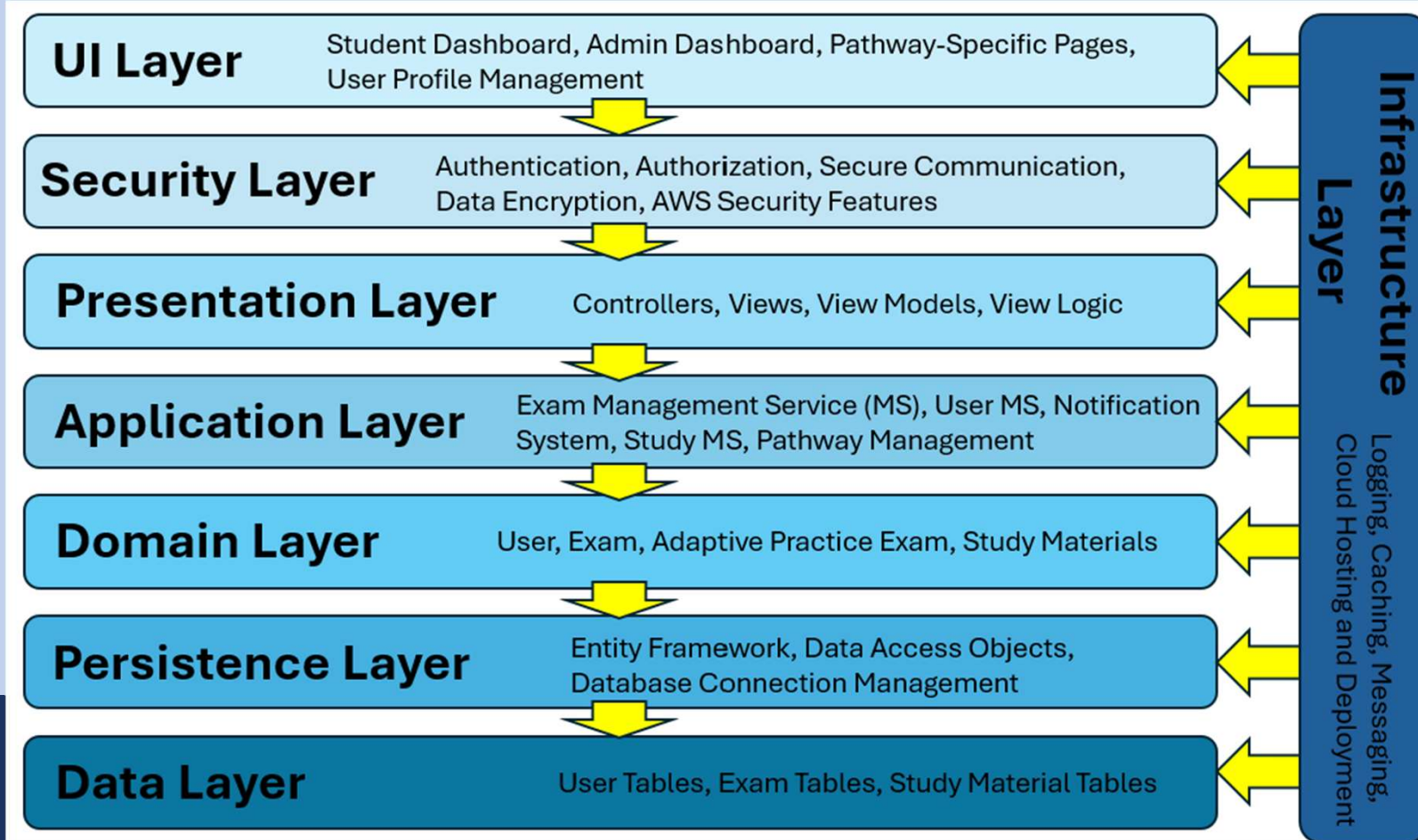
AI POWERED

- **ML-powered AI**
- Basic Rule-based AI

ADAPTIVE LEARNING

- **AI Driven Adaptive Learning**
- Static Quiz Questions

System Architecture



CODES, GUIDELINES, AND REGULATIONS



ASSOCIATION
FOR
COMPUTING
MACHINERY

Fairness,
Transparency, Privacy,
Integrity



FAMILY
EDUCATION
RIGHTS &
PRIVACY ACT

Data Protection,
Consent, Student
Rights



INSTITUTE OF
ELECTRICAL &
ELECTRONICS
ENGINEERS

Reliability, Safety,
Professionalism,
Quality



AMERICAN'S
WITH
DISABILITIES ACT

Accessibility,
Inclusivity, Usability,
Compliance

RISKS

RISKS FOUND

- User Adoption and Engagement
- Cross-Platform Compability
- Unforseen Budget Overruns
- Proprietary Content
- Long-Term Maintenance Challenges
- Operator Error in System Managment

MITIGATION

- Conducted user engagement campaign
- Applying responsive design principles
- Implementing real-time budget tracking
- Subject matter expert for intellectual property
- Thoroughly documenting of all coding processes
- Recursive comprehensive training, procedures, and role based access controls.

RISKS: CHATBOT

RISKS FOUND

- Content Overlap or Redundancy
- Training Data Quality
- Integration Complexity
- Real-Time Response Challenge
- Security

MITIGATION

- Dynamic Content Creation
- Regularly Updating Training Data
- Using Modular Design for Isolation
- Implementing Load Balancing
- Access Control, Tracking and Monitoring

RISKS: MACHINE LEARNING

RISKS FOUND

- Algorithm Bias
- Model Accuracy
- Overfitting
- Security of Machine Learning

MITIGATION

- Using diverse training datasets and regular bias audits
- Applied supervised learning algorithms with extensive validation
- Using cross-validation and regularization
- Employ adversarial training to make model resilient against malicious input

RISKS: DATA ANALYSIS

RISKS FOUND

- Data Breach/Data Loss
- System Security Vulnerabilities
- Misinterpretation of Data
- Algorithmic Errors

MITIGATION

- Implemented strong encryption protocols, secure data access control, regular security audits, and penetration testing
- Enforcing secure user authentication and maintain transparency and data usage
- Employing data validation checks
- Executing testing and validation of all data

RISKS: SECURITY

RISKS FOUND

- Unauthorized Access to Admin Functions
- Data Exposure in Transit
- Incomplete Session Handling
- Injection and XSS Vulnerability
- Delayed Incident Response

MITIGATION

- Enforce role-based access control
- Require HTTPS/TLS 1.3 for all communication
- Use session expiration, secure cookies, and automatic logout for inactivity
- Using Django's built-in sanitization, validate all inputs
- Maintain formal Incident Response Plan (IRP)

ACTION PLAN

2025	Jan	Feb	
	<ul style="list-style-type: none">• Transitioned from ASP.NET with C# to Django with Python• Rebuilt the platform from the ground up to support AI integration and adaptive learning	<ul style="list-style-type: none">• Established new database structure and authentication system• Set up the development environment and reconfigured version control	<ul style="list-style-type: none">• Implemented core platform features, including quizzes, user authentication and study materials• Began testing and refining the adaptive quiz system• Addressed cross-platform compatibility with design updates• Overcame propriety content challenges• Presented project poster at the Engineering Banquet

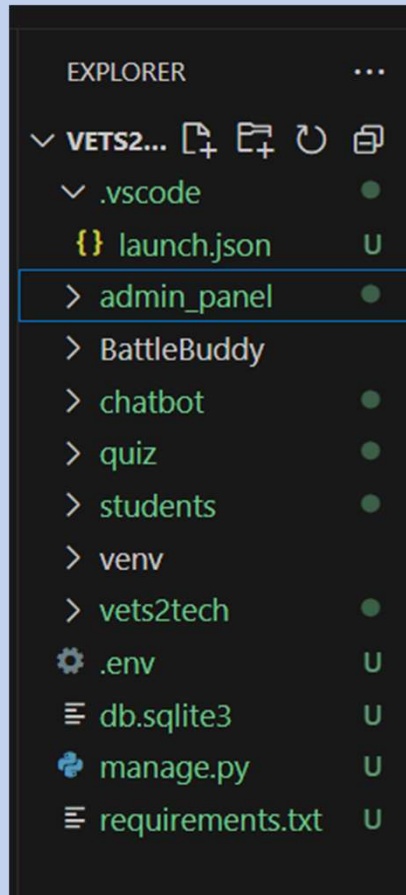
ACTION PLAN

2025	Mar	Apr	
	<ul style="list-style-type: none">• Conducted full system testing, including functionality, performance, and security• Fixed bugs and optimization issues to improve user experience	<ul style="list-style-type: none">• Finalized role-based access controls and admin functionalities• Created comprehensive documentation for long-term maintenance	<ul style="list-style-type: none">• Presentation to the EAB board• Ensured that the system components completed were working properly for stakeholder review• Conducted last-minute testing and refining at 85% completion• Preparing for presentation at scholars day• Preparing for future development



BACKEND

BACKEND



```
from django.shortcuts import render
from .models import Question, UserQuizProgress
from django.contrib.auth.decorators import login_required

@login_required
def generate_quiz(request, topic=None, question_count=15):
    user = request.user

    # If the user chose the "all" option, pull questions from all topics
    if topic == "all":
        questions = []
        for t, _ in Question.TOPICS:
            progress, _ = UserQuizProgress.objects.get_or_create(user=user, topic=t)
            topic_questions = Question.objects.filter(
                topic=t,
                difficulty=progress.difficulty
            ).order_by('?')[:10] # 10 per topic
            questions.extend(topic_questions)
    else:
        # Single-topic quiz
        progress, _ = UserQuizProgress.objects.get_or_create(user=user, topic=topic)
        questions = Question.objects.filter(
            topic=topic,
            difficulty=progress.difficulty
        ).order_by('?')[:question_count]

    return render(request, "quiz.html", {
        "questions": questions,
        "topic": topic
    })
```

BACKEND

```
from django.db import models
from django.contrib.auth.models import User # Links quiz progress to users

class Question(models.Model):
    """
    Stores a single quiz question with multiple-choice answers.
    Each question is tagged with a topic and difficulty level to support adaptive learning.
    """
    # Difficulty levels used to dynamically adjust question selection based on user performance
    DIFFICULTY_LEVELS = [
        ('easy', 'Easy'),
        ('medium', 'Medium'),
        ('hard', 'Hard'),
    ]

    # Predefined topics to categorize questions and track user strengths/weaknesses
    TOPICS = [
        ('cybersecurity', 'Cybersecurity'),
        ('networking', 'Networking'),
        ('cloud', 'Cloud'),
        ('computer_basics', 'Computer Basics'),
    ]
```

```
# Core question and answer fields
question_text = models.TextField() # Stores the question itself
option_1 = models.CharField(max_length=255)
option_2 = models.CharField(max_length=255)
option_3 = models.CharField(max_length=255)
option_4 = models.CharField(max_length=255)
correct_answer = models.CharField(max_length=255) # Correct answer for validation
difficulty = models.CharField(max_length=10, choices=DIFFICULTY_LEVELS)
topic = models.CharField(max_length=20, choices=TOPICS)

#user will see topic and difficulty level when they are taking the quiz
def __str__(self):
    return f"{self.topic} - {self.difficulty}: {self.question_text}"
```

BACKEND

```
class UserQuizProgress(models.Model):
    """
    Tracks an individual user's performance in each topic and difficulty level.
    Enables adaptive question delivery and personalized feedback by storing ongoing results.
    """
    # User the progress data belongs to
    user = models.ForeignKey(User, on_delete=models.CASCADE) # Links progress to a user

    # Topic and difficulty being tracked for targeted improvement
    topic = models.CharField(max_length=20, choices=Question.TOPICS) # Topic being tracked
    difficulty = models.CharField(max_length=10, choices=Question.DIFFICULTY_LEVELS, default="easy")

    # Performance tracking fields
    correct_count = models.IntegerField(default=0) # Number of correct answers
    incorrect_count = models.IntegerField(default=0) # Number of incorrect answers

    #shows user the subject and their current level
    def __str__(self):
        return f"{self.user.username} - {self.topic} ({self.difficulty})"
```

BACKEND

```
chatbot > training_data_extraction > extract_raw_text.py > ...
1 # -----
2 # Extract Text from PowerPoint Slides
3 # -----
4 # This script will search for all .pptx (PowerPoint) files
5 # inside the 'media/slides' folder and any subfolders (like 'Presentations').
6 # It will extract all the text from the slides and save it
7 # into a single text file called 'extracted_slide_text.txt'.
8 #
9 # This file will help us review all slide content and
10 # prepare it for chatbot or quiz training.
11 # -----
12
13 from pptx import Presentation # Import the library to read PowerPoint files
14 import os # Import the library to work with folders and files
15
16 # -----
17 # Function: extract_text_from_all_pptx
18 # Purpose: Search all folders, extract text from slides, save it to a text file
19 # -----
20 def extract_text_from_all_pptx(input_folder, output_file):
21     all_text = [] # This will store all text from all slides
22
23     # Walk through all subfolders and files inside input_folder
24     for root, dirs, files in os.walk(input_folder): # os.walk lets us search inside subfolders too
25         for filename in files:
26             if filename.endswith('.pptx'): # Only process PowerPoint files
27                 full_path = os.path.join(root, filename) # Full path to the .pptx file
28                 print(f"Processing file: {full_path}") # Show which file we are working on (DEBUG info)
29
30                 # Open the PowerPoint file
31                 prs = Presentation(full_path)
32                 slide_texts = [] # Store text from each slide in this list
33
34                 # Go through each slide
```

BACKEND

```
chatbot > training_data_extraction > generate_qa_from_text.py > generate_qa

2  # AI Q&A Generator from Extracted Slide Text
3  # -----
4  # This script reads extracted slide text and sends it to GPT
5  # (via OpenAI API) to generate Q&A pairs for chatbot & quiz.
6  # -----
7
8  import openai # To access OpenAI's GPT model
9  import os
10
11 # Load your OpenAI API key from environment variable for security
12 openai.api_key = os.getenv("OPENAI_API_KEY")
13
14 # Function to generate Q&A from text
15 def generate_qa(text):
16     response = openai.ChatCompletion.create(
17         model="gpt-3.5-turbo", # Use GPT-3.5 Turbo model
18         messages=[
19             {"role": "system", "content": "You are an assistant that generates clear question and answer pairs from text."},
20             {"role": "user", "content": f"Extract as many question and answer pairs as possible from this text:\n{text}"},
21         ],
22         max_tokens=1500, # You can adjust this if answers are too long
23         temperature=0.3 # Low temperature for accurate responses
24     )
25     return response['choices'][0]['message']['content']
26
27 # Main function to read extracted slide text and generate Q&A
28 def main():
29     input_file = "extracted_slide_text.txt" # File containing slide text
30     output_file = "generated_qa.txt" # Where to save Q&A pairs
31
32     if not os.path.exists(input_file):
33         print(f"Input file {input_file} not found!")
34         return
35
```


BACKEND

Django administration

WELCOME, **SUPERSTAR**. [VIEW SITE](#) / [CHANGE PASSWORD](#) / [LOG OUT](#)

Home > Chatbot > Training materials

Start typing to filter...

AUTHENTICATION AND AUTHORIZATION

Groups + Add

Users + Add

CHATBOT

Course completions + Add

Entrance exams + Add

Questions + Add

Subjects + Add

Training materials + Add

User performances + Add

Select training material to change

Search

Search

Action:

 Go 0 of 22 selected

<input type="checkbox"/>	QUESTION	ANSWER	DIFFICULTY
<input type="checkbox"/>	What is a lambda function in Python?	A lambda function in Python is an anonymous, small function defined with the 'lambda' keyword. It can have any number of input parameters but only one expression.	3

ADD TRAINING MATERIAL +

FILTER

Show counts

By difficulty

All

1

2

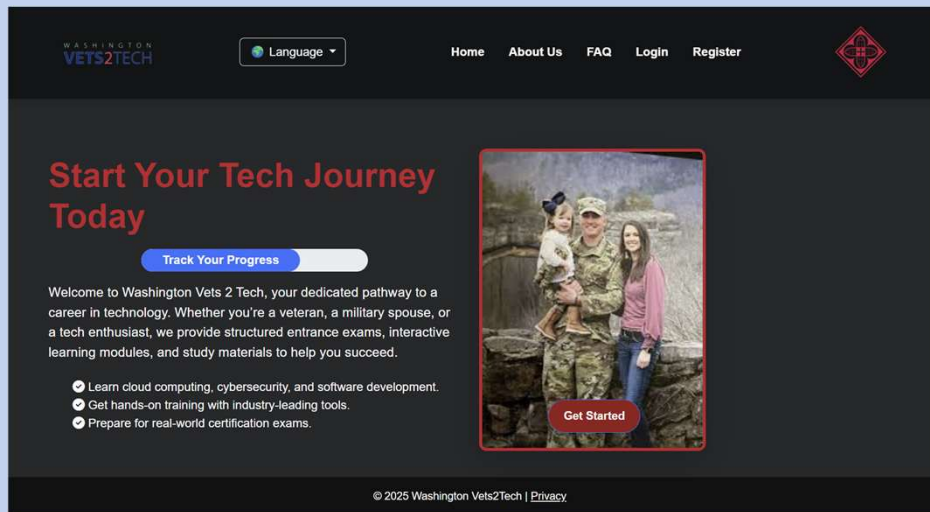
3



FRONTEND

HOME PAGE

Home Page



The screenshot shows the home page of Washington Vets2Tech. The header includes the logo, a language dropdown, and navigation links for Home, About Us, FAQ, Login, and Register. The main content area features a large heading "Start Your Tech Journey Today" and a "Track Your Progress" progress bar. Below this is a welcome message and a list of three bullet points: "Learn cloud computing, cybersecurity, and software development," "Get hands-on training with industry-leading tools," and "Prepare for real-world certification exams." A photo of a veteran with a child and a spouse is displayed with a "Get Started" button. The footer contains the copyright notice "© 2025 Washington Vets2Tech | Privacy".

WASHINGTON VETS2TECH

Language

Home About Us FAQ Login Register

Start Your Tech Journey Today

Track Your Progress

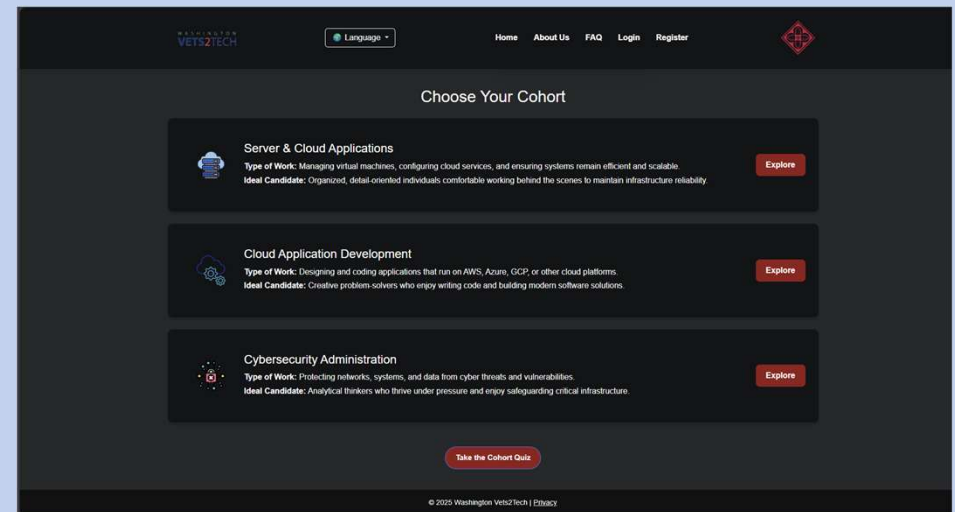
Welcome to Washington Vets 2 Tech, your dedicated pathway to a career in technology. Whether you're a veteran, a military spouse, or a tech enthusiast, we provide structured entrance exams, interactive learning modules, and study materials to help you succeed.

- ✓ Learn cloud computing, cybersecurity, and software development.
- ✓ Get hands-on training with industry-leading tools.
- ✓ Prepare for real-world certification exams.

Get Started

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Cohort Selection



The screenshot shows the cohort selection page of Washington Vets2Tech. The header is identical to the home page. The main content area is titled "Choose Your Cohort" and lists three cohorts: "Server & Cloud Applications", "Cloud Application Development", and "Cybersecurity Administration". Each cohort entry includes a "Type of Work" description, an "Ideal Candidate" description, and an "Explore" button. At the bottom, there is a "Take the Cohort Quiz" button. The footer contains the copyright notice "© 2025 Washington Vets2Tech | Privacy".

WASHINGTON VETS2TECH

Language

Home About Us FAQ Login Register

Choose Your Cohort

Server & Cloud Applications

Type of Work: Managing virtual machines, configuring cloud services, and ensuring systems remain efficient and scalable.

Ideal Candidate: Organized, detail-oriented individuals comfortable working behind the scenes to maintain infrastructure reliability.

Explore

Cloud Application Development

Type of Work: Designing and coding applications that run on AWS, Azure, GCP or other cloud platforms.

Ideal Candidate: Creative problem solvers who enjoy writing code and building modern software solutions.

Explore

Cybersecurity Administration

Type of Work: Protecting networks, systems, and data from cyber threats and vulnerabilities.

Ideal Candidate: Analytical thinkers who thrive under pressure and enjoy safeguarding critical infrastructure.

Explore

Take the Cohort Quiz

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TRANSLATION BUTTON

Internalization Framework

```
from django.conf.urls.i18n import i18n_patterns
from django.views.i18n import set_language
```

- Internationalization i18n framework is imported
- The languages are imported

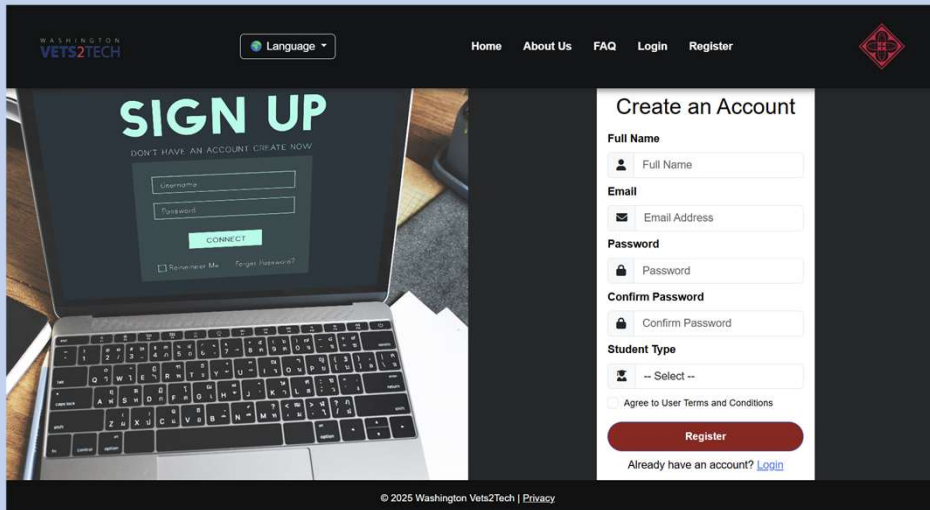
Integration for HTML

```
<html lang="{{ LANGUAGE_CODE }}">
<head>
  {% load static %}
  {% load i18n %}
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>{% block title %}{% trans "Washington Vets2Tech" %}{% endblock %}</title>
  <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css">
  <link href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0/css/all.min.css" rel="stylesheet">
  <link rel="stylesheet" href="{% static 'css/styles.css' %}">
</head>
```

- `{% load i18n %}` brings framework to the Template html file
- Trans and Block Trans are introduced
- The button's functionality is embedded into the navigation bar

USER INFORMATION

Sign Up



WASHINGTON VETS2TECH

Language

Home About Us FAQ Login Register

SIGN UP

DON'T HAVE AN ACCOUNT CREATE NOW

Username

Password

CONNECT

Remember Me? Forget Password?

Create an Account

Full Name

Full Name

Email

Email Address

Password

Password

Confirm Password

Confirm Password

Student Type

-- Select --

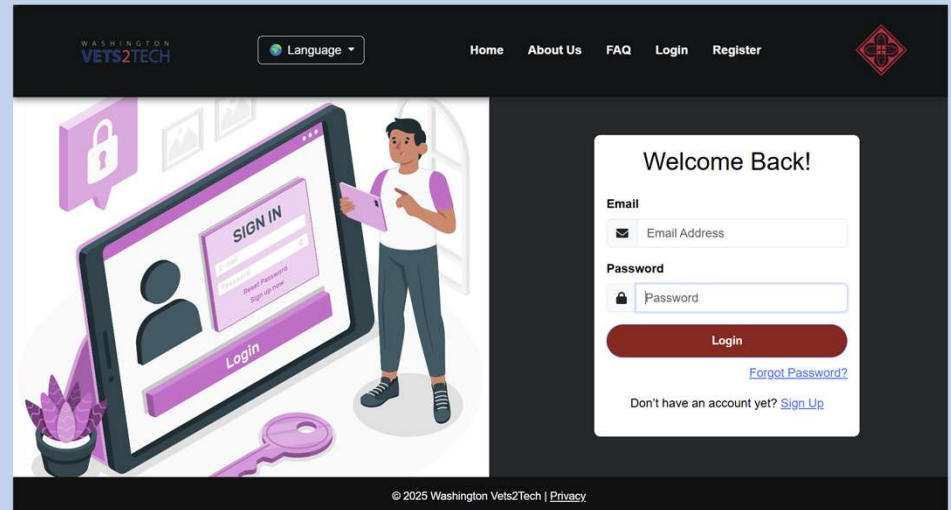
Agree to User Terms and Conditions

Register

Already have an account? [Login](#)

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Login



WASHINGTON VETS2TECH

Language

Home About Us FAQ Login Register

Welcome Back!

Email

Email Address

Password

Password

Login

[Forgot Password?](#)

Don't have an account yet? [Sign Up](#)

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COHORTS

Cohort Quiz

The screenshot shows a quiz titled "Which Cohort Is Right For You?". The quiz consists of six numbered questions, each with three radio button options. The questions are:

1. How do you prefer to work?
 - ☐ I love designing and coding innovative applications.
 - ☐ Enjoy configuring and managing IT infrastructure.
 - ☐ Fix protecting systems and networks from threats.
2. What aspect of technology excites you the most?
 - ☐ Building user friendly web applications and software.
 - ☐ Optimizing system performance and stability.
 - ☐ Investigating vulnerabilities and safeguarding data.
3. What type of projects inspire you?
 - ☐ Developing full-stack applications and interactive interfaces.
 - ☐ Deploying, monitoring, and managing cloud infrastructure.
 - ☐ Conducting penetration tests and implementing security measures.
4. How do you approach problem-solving?
 - ☐ Enjoy creatively coding and prototyping solutions.
 - ☐ Systematically troubleshoot and optimize systems.
 - ☐ Analyze risks and design defensive strategies.
5. What work environment appeals most to you?
 - ☐ A creative, collaborative team developing new software.
 - ☐ A dynamic IT department handling complex infrastructure challenges.
 - ☐ A security operations center where threats are monitored and mitigated.
6. How do you prefer to learn?
 - ☐ Through hands-on coding projects and interactive tutorials.
 - ☐ By tackling real-world system and network challenges.
 - ☐ Using simulated security scenarios and case studies.

At the bottom right of the quiz area is a red "Submit Quiz" button. The footer of the page reads "© 2025 Washington Vets2Tech | Privacy".

Cohort Materials

The screenshot shows a page titled "Server & Cloud Application Training". It features six red buttons arranged in two columns, each with a logo and text:

- Top Left: AWS logo, "AWS Certified Solutions Architect"
- Top Right: Microsoft logo, "Microsoft Azure Fundamentals"
- Middle Left: Kubernetes logo, "Introduction to Kubernetes"
- Middle Right: Google logo, "Google Cloud Fundamentals"
- Bottom Left: IBM logo, "IBM Cloud Learn Hub"
- Bottom Right: Cloud Academy logo, "Cloud Academy"

Below these buttons is a large red section titled "Test your cloud knowledge with the Challenge Bot!". It features a cartoon robot character and a "TAKE THE CHALLENGE" button.

On the right side of the page, there is a "Study Helper Chat" window. It contains the text "Hello! How can I help you today?", a text input field with the placeholder "Type your question", and a green "Send" button. There is also a small robot icon at the bottom right of the chat window.

The footer of the page reads "© 2025 Washington Vets2Tech | Privacy".

ROBOTS

Test Robot Html

```
<div class="quiz-bot-section">
  <p>Test your cybersecurity skills with the Challenge Bot!</p>

  <!-- Red container with the robot + black button -->
  <div class="challenge-bot-red">
    <div class="my-h1ml-robot">
      <!-- Antenna -->
      <div class="robot-antenna">
        <div class="antenna-ball"></div>
      </div>

      <!-- Helmet + Visor -->
      <div class="robot-helmet">
        <div class="robot-visor">
          <!-- Eyes -->
          <div class="robot-eye eye-left"></div>
          <div class="robot-eye eye-right"></div>
        </div>
      </div>

      <!-- SCARF (neck + tail) -->
      <div class="robot-scarf">
        <div class="scarf-neck"></div>
        <div class="scarf-tail"></div>
      </div>

      <!-- Body with blue chest plate -->
      <div class="robot-body">
        <div class="chest-plate"></div>
      </div>

      <!-- Arms - white arms with blue hands -->
      <div class="robot-arm arm-left">
        <div class="robot-hand hand-left"></div>
      </div>
      <div class="robot-arm arm-right">
        <div class="robot-hand hand-right"></div>
      </div>

      <!-- Legs - white legs with blue feet (both animate) -->
      <div class="robot-leg leg-left leg-wiggle">
        <div class="robot-foot foot-left"></div>
      </div>
      <div class="robot-leg leg-right leg-wiggle">
        <div class="robot-foot foot-right"></div>
      </div>
    </div>

    <!-- Black challenge button -->
    <a href="{% url 'challenge_test' cohort='cybersecurity' %}" class="btn-quiz-black">Take the Challenge</a>
  </div>
</div>
```

CSS Classes

```
.my-h1ml-robot {
  position: relative;
  width: 120px;
  height: 180px;
  animation: jump 1.5s infinite ease-in-out;
}

@keyframes jump {
  0%, 100% { transform: translateY(0); }
  50% { transform: translateY(-20px); }
}

.robot-antenna {
  position: absolute;
  top: -10px;
  left: 50%;
  transform: translateX(-50%);
  width: 3px;
  height: 15px;
  background: silver;
  border-radius: 3px;
}

.antenna-ball {
  position: absolute;
  top: -6px;
  left: 50%;
  transform: translateX(-50%);
  width: 10px;
  height: 10px;
  background: silver;
  border-radius: 50%;
}

.robot-helmet {
  position: absolute;
  top: 0;
  left: 50%;
  transform: translateX(-50%);
  width: 80px;
  height: 60px;
  background: silver;
  border-radius: 50px 50px 40px 40px;
  box-shadow: 0 0px 0px rgba(0,0,0,0.3);
}

.robot-visor {
  position: absolute;
  top: 5px;
  left: 50%;
  transform: translateX(-50%);
  width: 70px;
  height: 30px;
  background: #000;
  border-radius: 20px;
  display: flex;
  justify-content: space-around;
  align-items: center;
}
```


ADMINISTRATION

User Control Panel

WASHINGTON
VETS2TECH

Language ▾

HomeManage UsersHello, AdminUserAbout UsFAQLogout

Manage Users

Full Name	Email	Student Type	Actions
AdminUser	adminemail@gmail.com	None	<div>EditDelete</div>

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Cohort Control Panel

WASHINGTON
VETS2TECH

Language ▾

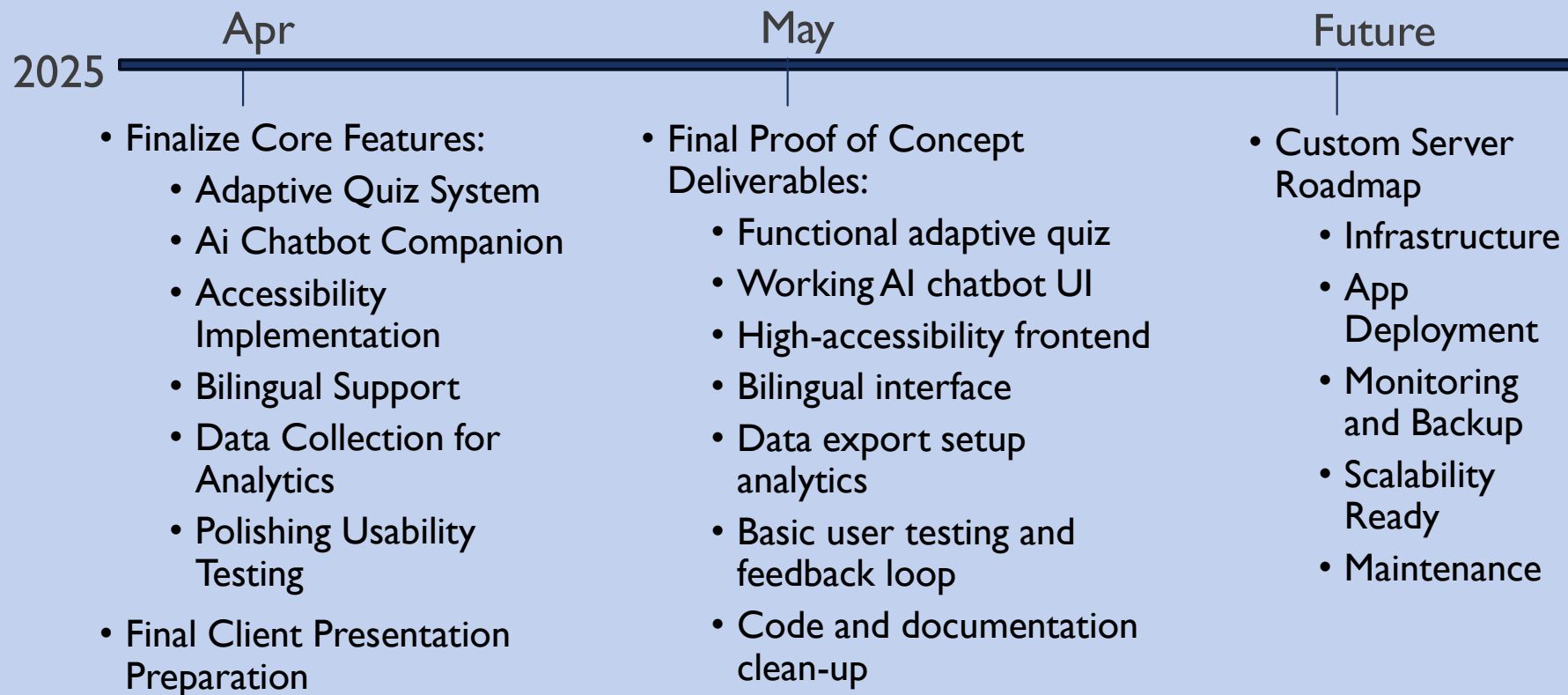
HomeUsersCohortsHello, AdminAbout UsFAQLogout

Manage Cohorts

Cohort	Status	Toggle
Server & Cloud Applications	Enabled	<div>Disable</div>
Cloud Application Development	Enabled	<div>Disable</div>
Cybersecurity Administration	Enabled	<div>Disable</div>

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NEXT STEPS FOR APPLICATION ENHANCEMENT





THANK YOU

Engineering Advisory Board

Saint Martin's University
Hal and Inge Marcus School of
Engineering



Dr. Dvorak

April 3, 2025