PC^2 Web Team Interface (WTI) Project Description

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1. Background

The PC^2 Contest Control System consists of two active versions: Version 9 (V9) and Version 10 (V10). Both versions are written in Java, but have substantially different architectures: V9 is a set of stand-alone Java applications which must be installed on each machine in a contest, whereas v10 is a web-based application.

V9 currently has two different mechanisms by which teams can interact with the system: the *V9 Application Team Client* and the *EWTeam Web Client.* V10 also has a web-based client for teams, different from the V9 EWTeam client. The V10 web team client interfaces with the V10 "AppServer", a module which provides client applications with REST-based web services.

The V9 Application Team Client is the most robust of the three existing team interfaces; it provides all the functionality required by a team in a contest and in essence acts as the definition of what a PC^2 Team Client must provide. The EWTeam client provides all of the functionality of the Application Team Client except for the "Test Run" function. The V10 Web Client is an incomplete partial implementation of team services.

2. Limitations Of The Present System

- The Team Application Client requires advance installation on every team machine. This is a significant drawback when hundreds of teams are competing or when contest organizers do not know ahead of time who will be competing (teams might join a contest at the last minute via the Web, for example).

- The EWTeam client architecture has design issues (for example, it requires polling the server to determine when contest state has changed), and it is implemented with a confusing mixture of PHP, Java/PHP interface code, and a PC^2 API interface module.

- The EWTeam is missing the Test Run function, which is currently not supported in the server-side functions of V9 (although a working draft of the required server-side functionality does exist).

- The V10 Team Web Client is incomplete and does not provide all the functionality required for a team client.

3. Project Goals:

The PC^2 Web Team Interface (WTI) project is intended to provide a single web-based system with the following attributes:

- Front-end HTML code runs on team machines in all modern browsers (including Chrome, Internet Explorer, Firefox, Safari, and Oasis) without requiring any special privileges or installations beyond common features such as enabling Javascript.

- Provides all of the functions currently available in the V9 Application Team Client, including:
  - Team Login
  - Submit run (including selecting Problem, Language, Main File, and Additional Files)
  - Test Run (including selecting all the above, plus Test Data File)
  - View Runs (display a list of all submitted runs, optionally filtered by Language, Judgement, and/or Problem)
  - Request Clarification (select a Problem and submit a clarification/question)
  - View Clarifications (display a list of all submitted clarifications, optionally filtered by Problem, and display the judge's response (if any) to any selected clarification)
  - Set Options (including for example changing Team Password – if allowed by the Contest Administrator; "do not pop up run confirmation windows", etc)

- Uses industry "best practices" for implementation, including for example modern front-end tool sets and formal API specification frameworks, REST interfaces, etc.

- Maintains backwards-compatibility with the V9 Application Team Client (that is, the V9 Application Team Client must still be able to be used to access a V9 system). The V9 EWTeam client and the partial V10 Team Client implementations may be assumed to be wholly replaced by the WTI project.

- Requires no polling; performs dynamic update of contest state information on the team display.

- Interfaces with both the PC^2 V9 Server and with the PC^2 V10 AppServer, by auto-detecting the PC^2 version to which it is connected.

4. Project Implementation Requirements

The following constraints apply to the implementation of the WTI system:

- The architecture and implementation of the system is to conform to industry "best practices", including for example separation of web UI components from back-end services via formally-defined interfaces (using, e.g., a Swagger specification or other equivalent formal API specification toolsets); appropriate use of modern web-development frameworks (for example, using Bootstrap for CSS development; using Angular for client-side control), etc.
- All web services are to be provided as REST-based Java EE services implemented using JAX-RS. REST endpoints must be consistent with the *CLICS Contest API Specification* at https://clics.ecs.baylor.edu/index.php?title=Contest_API as implemented by the PC2 V9 system.
- A strong preference exists for development to be done using Eclipse.
- Code is to be stored during development in a Git repository provided on CSUS machines and updated regularly to enable the PC^2 Development Team to track progress and offer suggestions.
- The implementation must be self-contained; i.e. it must not require a team machine to have Internet connectivity, e.g. to a CDN (Content Delivery Network).
- The implementation must be demonstrated to work correctly on at least one application server (e.g. NGINX, Apache, WebSphere Liberty, etc.).
- Developed code is to include extensive JavaDoc documentation (or corresponding comments for other language modules).
- The project is to include creation of at least the following documentation:
  - Updates to the PC^2 Contest Administrator's Guide as needed to explain the WTI system.
  - A PC^2 Team Guide, analogous to the existing PC^2 Team Guide, explaining from a Team's point of view how to use the PC^2 WTI system.
  - System Internals Technical Specifications describing the implementation and operation of the WTI project, including
    - the overall architecture of the system and each of its components;
    - how it interfaces to both the V9 and V10 systems;
    - what dependencies are contained in the system (what external tools and frameworks are needed to build the project, including the versions of each such tool/framework);
    - how to regenerate the system (e.g. an Ant build file, a list of build steps, or similar);
    - how to install the system (for example, instructions for installing it into at least one application server).
- All Project team members will be required to sign a Non-Disclosure Agreement (NDA) covering the existing PC^2 source code.
- All code developed during the Project will become the property of the PC^2 Project. Project team members will be permitted to use the code in demonstrations and presentations, including for

example for University purposes and for job interviews, but may not use the developed code for any commercial purposes.

5. Possible Project Architecture (Overview)

The following diagram shows a conceptual overview of one possible structure of the WTI project. Note that this does not describe a *requirement*; it is intended to provide context and give a general idea of the scope of the project.