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Foldit Biology (Task 1, 2, 3, 4 - Month 13-15)
Progress, Status and Management Report
Monthly Progress Report

Period Covered by the Report
August 1, 2014 - October 31, 2014

Date of Report: November 17, 2014

Project Title: Foldit Biology
Contract Number: N00014-13-C-0221
Total Dollar Value:
Program Manager:

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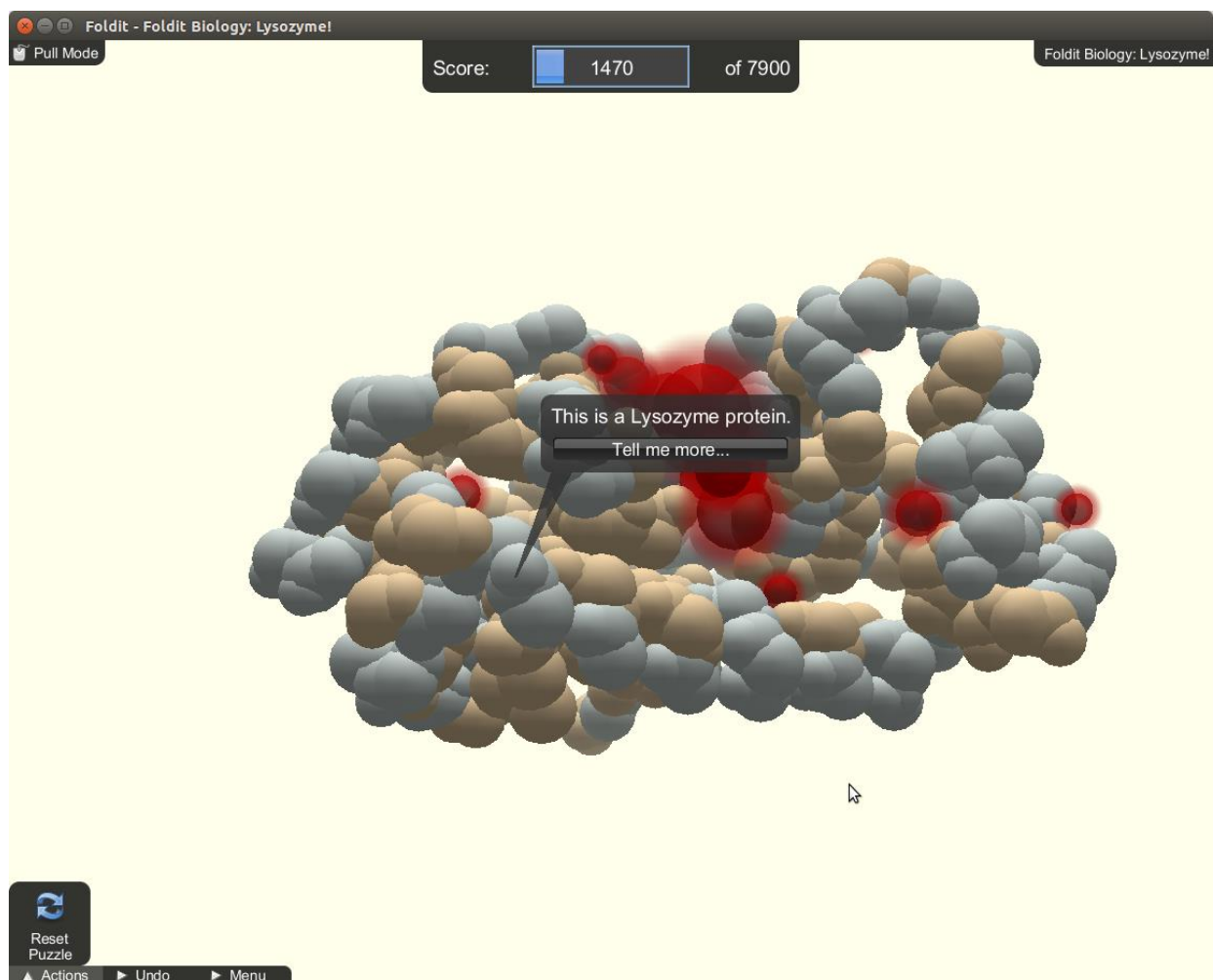
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Technical Information

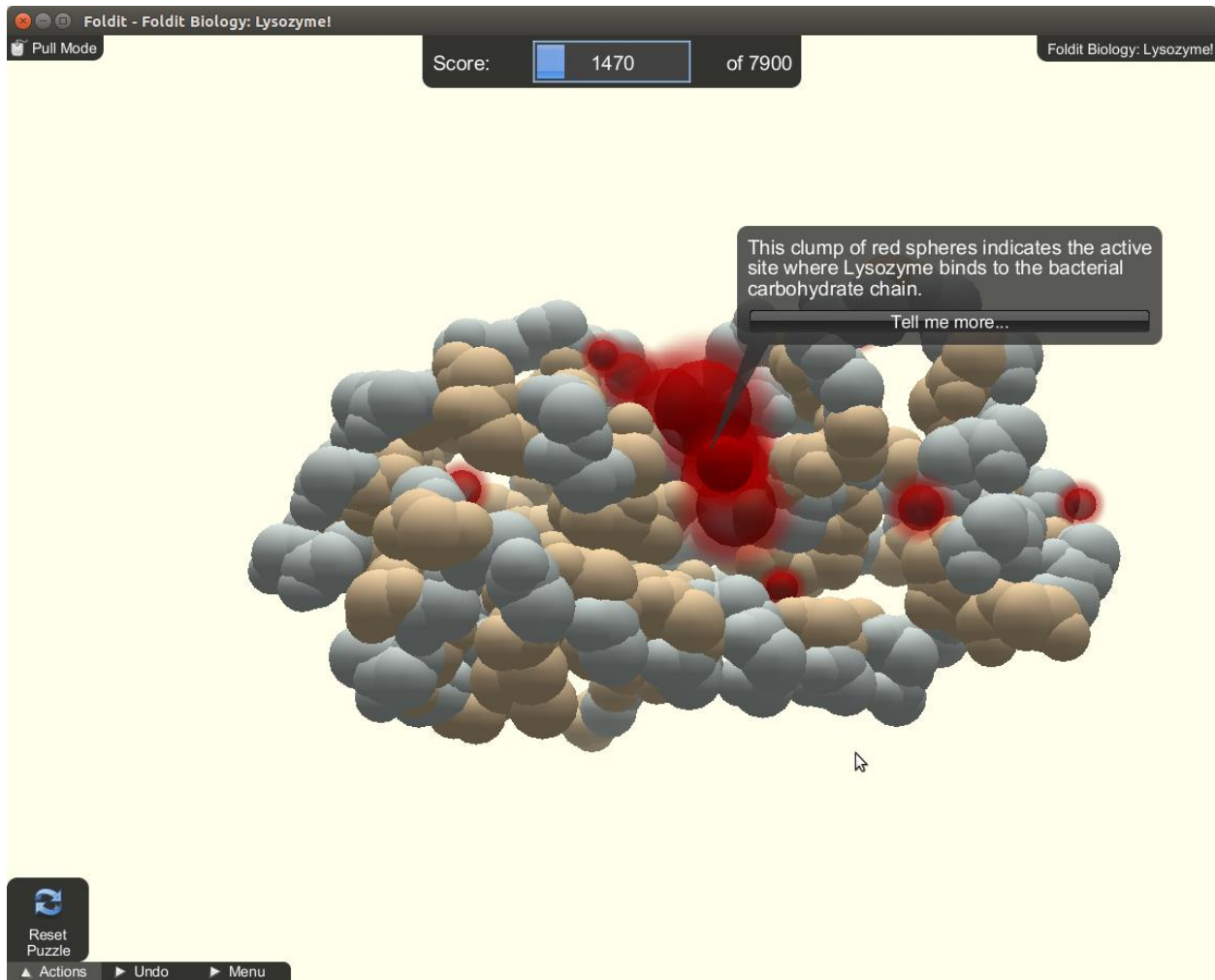
1. Technical Progress / Highlights - Observations

We have created Foldit-based lessons with several embedded activities that can be used in the classroom. Each student is assigned a computer, and the teacher uses the Teacher Co-Pilot to advance the lesson. When the lesson begins, students start the Foldit Biology Copilot application on their machine. The application displays the message “Eyes up front!” when an activity is not currently underway. When the teacher begins an activity with the “start activity” button, the students’ Foldit clients will start the activities with the corresponding activity IDs. The teacher can pause or resume the current activity. Clicking “Done” for the current activity will put Foldit into pause mode. When another activity is started, the same instance of Foldit will resume and load in the new level. There is Foldit text/photo material for each lesson.

This is an example of the current Lysozyme protein activity:



The students are directed through the activity from within the Foldit application, following the text bubbles that direct their attention to the relevant parts of the protein.



After the activity has finished, the teacher can press Done, which will display the “Eyes up front!” message in Foldit once again.

The Biology version of Foldit has been constructed to take advantage of existing Foldit instructional features, such as the dynamic text bubble system. We also inherit the content distribution system from Foldit. This allows us to dynamically load new updates to the game, as well as new lessons or activities.

Integrating with the Copilot has also allowed us to simplify much of the interface. Foldit no longer has to deal with logging the student in or switching activities/puzzles. The login is handled by the Copilot separately and activity switching is passed as an event from the Copilot. The student only is presented with the activities themselves, so there is no risk of students going off-task or getting stuck within the application itself.

2. Results or Problems and Solutions

Since Foldit is a natively compiled C++ application, we developed a generic Flash “wrapper” application that runs in the browser where Co-Pilot integrated games normally run. This wrapper application opens a socket connection to the native executable, allowing it to forward any API calls to and from the native application. On the Foldit side, we have created a C++ class that may be plugged into any C++ application to communicate with the Flash link application. This class runs in its own thread and handles all communication with the Flash application. The integrating application is responsible only for starting

up the thread itself, and then registering function calls for each of the available events from the API. This makes the process of integrating a C++ program very similar to the process for standard Flash applications. The end result is that Foldit can be integrated into our Co-Pilot Framework with no changes to the Framework itself. It is worth noting that this approach can now be applied to any native executable; all that is necessary is modification of the native application to allow it to listen on a socket and implement the functionality required by the API calls.

Current limitations of the Foldit Co-Pilot integration are that the user must start the Foldit application themselves and make sure it is ready to accept connections before an activity is started. This is clearly not ideal, so we are looking into having the lesson launch Foldit in a more automated way.

3. Significant Accomplishments Anticipated During Next Reporting Period

We will re-engage with our biology teacher contacts to demonstrate the system and solicit their feedback. We will further develop the curriculum around the Lactase, Hemoglobin, and Lysozyme examples. We also expect a significant effort into bug fixing and stabilization.

4. Publications relevant to this effort

- N/A

5. Meetings and Events (Please include meetings with subcontractors)

- Weekly Foldit Biology coordination meeting
- Ah-hoc meetings with biology teachers

6. Changes to the Contract Organization

None.