Project Plan

Risk Mitigation Metric for Multi-Factor Authentication Systems

Project Manager: Bob O'Brien

Technical Lead: Stephen Paul King

Project Scope

The objective of this project is to implement a proof-of-concept demonstration system which showcases the use of a novel Risk Mitigation Metric (RMM) module which relies upon the Maximum Relative Entropy (MrE) probability calculation algorithm to improve the ability to evaluate the risks associated with accessing some target asset that is "defended" by a multi-factor authentication system. The demonstration system will be used with both simulated and "real life" attempts to log into a series of (fictitious) software applications in order to demonstrate the capabilities and advantages of the MrE-based RMM.

Customer / Agent

The Customer is the Defense Advanced Research Projects Agency (DARPA) – a branch of the Department of Defense of the United States of America.

BIT Systems (BITS) will be acting as agent/representative of DARPA and will manage routine communications and interactions on DARPA's behalf during the project.

Assumptions

The following assumptions are made:

A.1. The demonstration product resulting from this effort is just that: a demonstration product. Development of a production-strength product is beyond the scope of this project. It is assumed that the resulting product will not be used as-is for any real-world security application.

A.2. At project start time, it is assumed that we will be able to identify a satisfactory collection of Identify Authenticator products which meet the needs of the project. (Meeting the needs of the project requires that these authenticators return more than a simple "pass / fail" result – that they instead return some sort of "reliability" score.)

A.3. It is assumed that the availability of Clarkson University resources – particularly Dr. Giffon – as well as those of other contracted individuals will be sufficient throughout the life of the project.

Limitations

The following Limitations are identified:

L.1. In order to meet delivery time and budget, the demonstration will be implemented within an environment based upon Microsoft's .NET platform. The runtime environment for the resulting product must provide a .NET environment, and specifically must be able to support the Infer.NET probability calculation library.

L.2. The project team is widely distributed geographically. This will place practical limits on communication schedules.

Risk and Issue Tracking

A Risk and Issue Log will be maintained via Excel Spreadsheet. It will be reviewed at least weekly by the entire project team under the direction of the Project Manager. This document is located at **<gdrive>/ProvenSecure/Projects/CFT2/Risks and Issues.xlsx**

(Note: Until we migrate documentation to a location that provides for proper change / version control, update access to this document is limited to the Project Manager. Others team members can view it – and are encouraged to. But changes will be made in a controlled fashion by the Project Manager. Any team member with Risks, Issues, or comments that need to be documented should notify the project manager immediately – don't wait for a status meeting.)

ProvenSecure Project Team

Role	Name	Responsibilities
Project Manager	Bob O'Brien	Perform overall Project Management activities (manage schedule and budget, assign resources) Prepare key project documentation, status reports and milestone completion reports Act as Scrum Master during development sprints
Technical Lead	Stephen Paul King	Oversee project progress from a technical perspective Act as "Product Owner" during development sprints. Guide selection of appropriate work to be included in sprints, and accept completed work at the end of sprints
Administrative Lead	Bill Whitescarver	Interact with Customer for Adminimstrative issues Sign necessary contracts, orders, etc.
Architect / Developer	Allen Francom	Design the overall demonsration "bench" system and its components (except for the MrE calculation engines) Act as Designer/Developer during development sprints
Technical Advisor	James Whitescarver	Assist in defining solutions for technical & theoretical problems as they arise. Offer advice regarding the design of the overall

		architecture of the demonstration bench.
Technical Advisor	V Rao Bhamidipati	Assist in defining solutions for technical & theoretical problems as they arise. Offer advice regarding the design of the overall architecture of the demonstration bench.
"Hardware" Systems Manager	Roman Anderson	Implementing Windows Virtual Machine testing environment.
Technology Advisor / Tester	Paul Dube	Research potential retail-market authenticators for appropriateness in this effort Perform "live" testing of finished demonstrator

External / Contract Participants

Role	Company/ Organization	Name	Responsibilities
University Research Lead	Clarkson University	Dr. Adom Giffin	Prepare white paper required for completion of Milestone 1 Contribute to the design of the MrE algorithm engine being coded into the RMM
Architect/Developer	(independent contractor)	Renaldus Urniezius	Design and code the MrE algorithm engine Participate in integrating the MrE engine into the RMM
Technical Advisor	(independent contractor)	Dr. Joseph Skufca	Provide technical advice and assistance as needed to MrE algorithm development Provide technical advice and assistance as needed to the team integrating authenticators into the demonstration base.

Customer Representatives

Role	Company/ Organization	Name	Responsibilities
Administrative Contact	BIT Systems	Thomas Jacques	Administrative issue POC
Technical	BIT Systems	Kyle Dausin	Technical issue POC

Contact			
Customer Program Manager	DARPA	*insert name here*	*list project-related responsibilities here*

Schedule & Budget

Overall Summary Information

Expected Start Date	24-Jun-2013
Expected Completion Date	11-Oct-2013
Total Scheduled Effort (hours)	2694
Total Project Budget (Labor, Materials, Travel, etc.)	$ 125,830
Milestone Summary Document	<gdrive>/ProvenSecure/Projects/CFT2/CFT2 Milestone Analysis (FINAL REVISION) (gdoc) PSSCFT2 google group members here: https://docs.google.com/document/d/18yPVXdeXFKqoE_vwiv-auVcMLErU_obGg3BYVlLG_50/edit#heading=h.d6oejpf1y3jy
Schedule Document	<gdrive>/ProvenSecure/Projects/CFT2/working schedule.xlsx Team members in the PSSCFT2 google group can view the current project schedule here: https://docs.google.com/file/d/0ByI-WJm63WrwU3U0RVFjU0htQ2c/edit?usp=sharing

Communication Plan

Item	Frequency	Delivery Method	Who Is Responsible	Comments
Internal Team Status Meeting	weekly	Google+ Hangout	Bob O'Brien	Internal status will initially be reported and discussed at weekly Sunday evening meeting. If team deems it necessary, we will move to a dedicated meeting at a different date/time for this purpose.
Milestone Completion Reporting	As needed (approx. 2 week	.PDF format document	Stephen Paul King	Bob O'Brien will prepare project-related status reports. Stephen will review, add any technical comments

	intervals)			that are necessary, and submit as evidence of completed milestone.
Payment Invoices	As needed (milestone completion)	.PDF format document	Bill Whitescarver	Bob O'Brien will generate invoices. After review to ensure completeness, Bill will forward to BITS for payment.
Final Project Report	End of project	.PDF formant document	Stephen Paul King	Final report describing the results of the testing and performance of RMM and MrE will be developed by Clarkson and ProvenSecure jointly.

Summary Description of Approach

The effort will begin with two concurrent tracks:

- **Milestone 1** involves Dr. Giffon of Clarkson University researching and writing a White Paper outlining the value of the Maximum Relative Entropy approach to probabilistic analysis within the context of multi-factor authentication software systems. While the project team already has very definite ideas regarding the benefits and best use of an MrE engine, it is hoped that this additional research – focused on the specific domain of authentication analysis – will yield additional insights that will then be incorporated into functional requirements of the proof-of-concept application that we are constructing.

- **Milestone 2** involves the "technical" team doing the functional analysis required to develop a set of use cases that will make up the high level specifications of the system we are building. Once we are satisfied that we have at least defined enough such "User Stories" (using the Agile/Scrum parlance), we will be able to select the ones to be addressed in the first development sprint. Those, in turn, will be further analyzed to identify "Tasks" that will make up the actual development goals of the sprint. Milestone 2 is complete when we have sufficient specification (stories and tasks) to fully define the work requirements for the first development sprint. It is important to note that functional analysis will not end with Milestone 2. User stories may be refined, and new ones added, particularly as results from the white paper analysis are considered. Task identification will be ongoing as well – not being required until just before a story is scheduled within a sprint for implementation.

Milestones 3, 4, 5, and 6 represent the actual development iteration cycles of the project. Each of the four cycles will be conducted using the Scrum approach, which consists of the following:

1. A Planning Meeting held before the sprint starts to identify which stories are to be included, review the tasks, and ensure the estimates for the tasks seem reasonable.

2. Each day of the sprint will begin with a "Virtual Standup". Scrum methodology calls for very brief face-to-face meeting of all those involved in the design and coding of the

system. In our case, geography prevents us from being physically face to face, and time zones may prevent us from even all meeting together. Nonetheless, the Project Manager / Scrum Master (Bob O'Brien) will communicate with each developer/architect/designer daily to ensure the tasks in the sprint are being worked completed, the burn-down chart (the list of completed and outstanding activity) is being updated, and any problems are dealt with.

3. Nine days of each sprint will be used for "development". On the tenth day, the system will be delivered to the testing platform. The Product Owner (Stephen King) will exercise the system and "Accept" or "Reject" specific user stories based on the performance of the test system. Rejected Stories are returned to the backlog.

4. If this is the not the last sprint, the Planning meeting for the next sprint will now be conducted and stories for the next sprint selected.

5. At the end of the tenth day, all source code will be catalogued. Documentation required for the Milestone Summary (backlog details, upcoming sprint task details, status summary, updated schedule and budget) will be prepared as well.

Sprint1 (Milestone 3) will be focused on creating the code necessary to define and capture the various risk ratings that will be used to define "environmental" situations surrounding a hypothetical login attempt. We will also use Sprint 1 to get our virtual test environment activated.

Sprint 2 (Milestone 4) will be focused on completing the end-to-end processing that will drive all of our testing. It will, however, use "stubs" instead of actual calls to authenticators and the RMM. In the meantime, RMM core design will continue at Clarkson.

In Sprint 3, we will replace stubs with actual calls to authenticators, and instantiate the "real" RMM code.

Sprint 4 will involve final tuning of the RMM and MrE engine, and – if time permits – addressing some "nice to have"s that we may have identified along the way. Due to some logistics issues with the developer, Sprint 4 was extended by two days to end on September 11, 2013.

Sprint 5 will be a "minisprint", beginning on Thursday, September 12, 2013 and ending on Friday, September 20th. This sprint will involve final resolution of issues with authenticator APIs (especially those that are with not-yet-commercial systems). Sprint 5 will take place concurrently with the data gathering activities during Milestone 7 and will not generate any additional "milestones" or invoices.

Sprint 6 will be another "minisprint", beginning on Monday, September 23, 2013 and ending on Monday, September 30th. This will include all "batch" components and the simulated login driver. Data gathering will be concurrent.

Following the deployment of the final sprint's Bench, **Milestone 7** will consist of final delivery of the proof of concept system to the testing platform (and most likely to a secondary platform independently managed by BIT Systems). It will then be exercised using a combination of "real user" interaction and "synthesized" interactions to produce statistically significant number of events covering the range of conditions we desire to test. Final performance reporting will be drafted. Final copies of source code and other documentation will be delivered along with the proof-of-concept executable image, and the project will be closed down.

The delivered "Bench Test" software will consist of a single executable image that acts as a wrapper for several "tools" in addition to the Risk Mitigation Module (RMM):

- The **Security Auditor (Risk Card)Tool** which will be used to collect information to quantify risk associated with various environmental factors according to NIST guidelines.
- The **Authenticator Session Capture Tool**, which allows a tester to produce a full set of "authentication session" data quickly. Several authentication methods are modeled (e.g. password, challenge questions), others are "real" (e.g. Voice, Face, SMS). A session, consisting of a complete set, is saved for later playback through a batch "login simulator".
- The **Batch Processing Tool** that will actually run the cases amassed by the User Emulation Generator Tool
- The **Login Simulator Tool** will provide a "real" login experience, and can be used to assess the performance of the RMM-base authentication validation.

Revision History

LEAVE THIS INSTRUCTION IN PLACE. Insert a new row immediately below the header row when recording a new revision. This will ensure that the current revision is the first line in the table.

Revision Date	Revision Author	Revision Details
23-Sep-2013	Bob O'Brien	V6.0 – Added information on "Sprint 6" and further adjustments to testing procedure.
12-Sep-2013	Bob O'Brien	V5.0 – Added information on "Sprint 5" and adjustments to testing procedure
25-Aug-2013	Bob O'Brien	V4.0 – Added notes in Summary description revising "end of Sprint 3" expectations and adding post-Sprint 4 "mini-sprints".
11-Aug-2013	Bob O'Brien	V3.0 – Added notes in Summary Description about possible start of some testing at end of Sprint 3.
27-Jul-2013	Bob O'Brien	V2.0 – Added general objectives for the four sprints
14-Jul-2013	Bob O'Brien	V1.2 – Added brief description of deliverable bench product; completed team roster
13-Jul-2013	Bob O'Brien	V1.1 – Corrected misspelled names
12-Jul-2013	Bob O'Brien	V1.0 – Initial Version completed
05-Jul-2013	Bob O'Brien	V0.1 – Initial Version