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| **Changelog** | | | | |
| **Project:** Team Decided Raft Consensus | | | | |
| **Please note, hyperlinks in Section are linked to nearest subheading** | | | | |
| **ID** | **Section** | **Type** | **Description** | **Notes/Justification** |
|  | Project Vision,  User Environment,  Example Scenario 1 | Clarity | Specifying .NET core server to drive home target market | Clarity |
|  | Project Vision,  User Environment,  Example Scenario 1 | Clarity | Directly specifying how example scenario 1 would make use of this library | Clarity |
|  | Project Vision,  User Environment,  Example Scenario 2 | Clarity | Rephrase sentence for clarity | Clarity |
|  | Project Vision,  Product Overview,  Needs and Features (Functional requirements) | Clarity | Added hyperlinks to Prototypes to our Nuget package | Clarity |
|  | Project Vision,  Product Overview,  Needs and Features (Functional requirements) | Project schedule update | Moved Log Compaction requirement to Version 1.0 instead of Prototype | We think this is still an important feature, however it does not fall on the critical use case which is the requirement of Prototype milestone. This will be implemented later. |
|  | Project Vision,  Product Overview,  Needs and Features (Functional requirements) | Scope management | Dropping Warm Node feature | We don’t believe this is an important feature to the product, perhaps it may be included later in an extended life cycle of the library, however we won’t be adding it for this project. The use case just isn’t that critical. |
|  | Project Vision,  Product Overview,  Needs and Features (Functional requirements) | Scope management | Changing Ability to Pick Ideal Leader to “Ability to attempt to designate a node to run the UAS” | Picking an ideal leader is very hard to implement, and heavily dependant on how each UAS defines fitness. We think it’s better to leave that scope to the UAS developers, however we then need to add the ability to attempt to make a node the leader of the cluster. They can use this on their fittest server to start/takeback UAS. |
|  | Project Vision,  Product Overview,  Needs and Features (Non-functional requirements) | Clarity | Added hyperlinks to Prototypes to our Nuget package | Clarity |
|  | Project Vision,  Product Overview,  Needs and Features (Non-functional requirements) | Project schedule update | Changing the release of the Nuget package to Prototype from Final | Part of the requirements for the prototype were “deployed in the intended production environment”, this change directly ticks that requirement |
|  | Project Vision,  Product Overview,  Needs and Features (Non-functional requirements) | Scope management | Removing Network Agnostic option from compatibility non-functional requirement | We don’t believe this is an important feature to the product, perhaps it may be included later in an extended life cycle of the library, however we won’t be adding it for this project. The use case just isn’t that critical. Although it’s a relatively simple add, to confidently consider it working we’d need to implement and tests a second networking stack using it. |
|  | Project Vision,  Product Overview,  Justification | Clarity | Adding the caveat to using the library in a 30-60 tick game of needing performance analysis to be run first | Although, calculations of round trip time conditions can show that this is possible, we’re aware the algorithm is currently running too slowly and needs performance analysis to be able to function at this level. |
|  | Project Vision,  Product Overview,  Justification | Clarity | Rewriting to paragraph about justifying removing Ability To Pick Ideal Leader feature | As stated above, implementing the feature is unreasonably cumbersome and UAS specific. So we’ll be leaving this up to, and enabling the ability for, the people to implement the ideal leader selection themselves. |
|  | Project Vision,  Product Overview,  Justification | Scope management | Deleted paragraph justifying Warm Nodes | As stated above, we don’t believe this feature is so important |
|  | Requirement model,  Use Case Model | Update | Remove “Send Message” and “Receive Message” use cases | This was part of the network agnostic feature we were going to implement, however as stated above we’ve removed this feature as it’s been deemed not important enough to implement |
|  | Requirement model,  Use Case Model | Update | Remove “Request Fitness” and “Respond to Fitness” use cases | This was removed as we’ve changed from implementing the design of fitness calculation ourselves, and offloaded that ability to the UAS developer through enabling a “Attempt to Run UAS” use case for them to use when doing their own fitness algorithms if they’d like. |
|  | Requirement model,  Use Case Model | Update | Added “Attempt To Run UAS” use case | We added this use case to allow developers to implement their own fitness algorithms to decide which node should run the UAS |
|  | Requirement model,  Use Case Model | Update | Remove ”Run Cluster” use case | We were previously viewing this from a perspective that a node needs to make a cluster for it to exist for nodes to join. We’ve now evolved our view to now being that each node simply tries to join the cluster it’s been instructed to, simply assuming it exists. And when many nodes talk to each other, and they’re all assuming it exists, they start the cluster. This means developers only need to use the one “Join cluster” use case now |
|  | Requirement model,  Use Case Model | Update | Remove “Confirm Identity” use case | Our initial plan was to have identities based on certificates, meaning the security on the communication was based on the UAS Confirming the identity of any joining nodes. However, the implementation was more difficult than it was worth, so we’ve now changed to the security being based on zero knowledge password proofs (which is using hashes with nonce’s to conduct a two way challenge/response) |
|  | Requirement model,  Use Case Model | Update | Changed “Start Server” and “Stop Server” use case names to “Start UAS” and “Stop UAS” | Change terminology to better describe the action required and implemented. |
|  | Requirement model,  Use Case Model | Update | Changed “Read Entry Value” use case to “Read Log” | Change terminology to better describe the action required and implemented |
|  | Requirement model,  Short Use Case Descriptions | Update | Remove “Send Message” and “Receive Message” use cases | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Remove “Request Fitness” and “Respond to Fitness” use cases | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Remove ”Run Cluster” use case | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Added “Attempt To Run UAS” use case | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Remove “Confirm Identity” use case | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Changed “Start Server” and “Stop Server” use case names to “Start UAS” and “Stop UAS” | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Short Use Case Descriptions | Update | Changed “Read Entry Value” use case to “Read Log” | Additional changes required in Short Use Case Descriptions from changes above made to Use Case Model |
|  | Requirement model,  Domain model | Update | Updated Domain model to include the current implemented consensus API | Changes were required as we’d updated the underlying API, so this needed to be reflected in the Domain Model |
|  | Requirement model,  Discussion regarding CCRD | Reflection | Added reflection paragraph on how we have cover CCRD | Clarity |
|  | Final Architecture,  Decisions, Constraints, and Justifications,Universally standard data structure for distributed log | Clarity | Re-wote discussion on Key Value structure used in our implementation. | Expressed the log better as a key value data structure, and explained the choice against using Raft’s normal List style log. |
|  | Final Architecture,  Decisions, Constraints, and Justifications,Task/callback style API | Clarity | Added section discussing the asynchronous design of methods | Clarity primarily, but we noticed it as an important design consideration which had been omitted |
|  | Final Architecture, Architectural Mechanisms, Architectural Mechanism 4 - Security | Update | Qualify the way in which we implement security within the library. | We are no longer using manual verification and certificate based authentication, we’re moving onto a simpler to implement, and simpler for usability reasons of password based authentication. |
|  | Final Architecture, Layers or Architectural Framework | Update | Update image to reflect API implementation | Changes were required as we’d updated the underlying API, so this needed to be reflected in the diagram |
|  | Risk List  Generic Project Risk | Update | Changed Scope creep inflates scope probability to “Medium” from “Low” | Although during our current work we’ve found that we’re reducing scope due to time restrictions, rather then scope creeping, we’re aware that next session is all about adding features. During our first session we became aware during implementing features that we had to add additional supportive features as well, showing that features can quickly get away from you, hence our change to “Medium”. |
|  | Risk List  Generic Project Risk | Update | Estimates for milestones are inaccurate, marking probability to “High” from “Medium” | As we can see from our iteration plans the only consistent thing we could predict is that we’d predict incorrectly. We did however innact the Contingency Plan of spending time trying to iteratively identify root causes, and better calculations for estimating. We improved our estimations from 400% out to 110% out, and we can more reliably predict times using the “double it, plus a bit” method. This root issue is we don’t have the real world experience to accurately estimate how longs things will take yet. |
|  | Risk List  Generic Project Risk | Update | Changing “Finish project too early” risk to “Low” probability from “Medium” | We’ve simply got too many nice to have features we’d like to add and not enough time to add them all, so it’s now about picking the desired features. We won’t finish early. |
|  | Generic Project Risk | Update | Closed the risk of “Technology components have security vulnerabilities” | This is because we’re now using Microsoft’s own implementation of security algorithms, these are patched automatically through Windows Update. |
|  | Generic Project Risk | Update | Reduced risk of “Code quality issues” from “High” to “Medium” | Using Style Guides, Peer Programming, completed a bunch of exhaustive tests through development find bugs, and also have unit testing/integration testing on major points |
|  | Generic Project Risk | Update | Closed risk of “User acceptance failure” | We’ve successfully implemented this library into a standalone Prototype which was built with only the Nuget package, we also made and showed it working properly with an installer. |
|  | Project Specific Risk | Update | Changing “Poor software quality” probability from “High” to “Medium” | Using Style Guides, Peer Programming, completed a bunch of exhaustive tests through development find bugs, and also have unit testing/integration testing on major points |
|  | Project Specific Risk | Update | Closed risk of “Security too complex” | We’ve successfully implemented security into the library. It was initially too hard, as we predicted, so we changed to using a zero knowledge proof authentication method, and Microsoft’s own security algorithm implementations rather than a library |
|  | Project Specific Risk | Update | Closed risk of “Prototype failure” | We’ve successfully implemented this library into a standalone Prototype. We recognised that it’s probability of occurrence was medium, with a high impact, so we mitigated this through starting this as early as possible. |
|  | Project Specific Risk | Update | Changing “Multithreading introduces high level of difficult in troubleshooting” from “High” to “Extra High” | The level of difficulty involved in troubleshooting multithreaded errors/bugs etc, is far beyond any reasonable expectation placed upon a student project. The effort and difficult of this has forced us to research and design mechanisms and tools to aid in the process (i.e. intrinsic logging, and learning visual studio multithreaded step through processing). There is no way we could have predicted simply how difficult this issue was for us, and the time sink it was during the debugging process. When we initially set up with 3 threads per node for networking, 2 threads per node for consensus and the main thread, we had times troubleshooting errors where there was up to 50 running threads. We had to heavikity refactor focusing on code quality, deadlock avoidance techniques and reduction of threads. |
|  | Project Plan | Update | Set E-4 iteration final date to 20/06 | Jim graciously gave us an extension of two weeks for us to complete our work within, this is reflective of that. As E-4 was targeted for contingency of the E-3 iteration, the accuracy of this subject’s Project Plan still stands. |
|  | Project Plan | Update | Changing our **C-1** iteration next session to be focusing on code quality, rather than implementing the Dynamic Cluster Membership feature straight away | Keeping our risk list in mind, we can see the biggest risks to our project currently primarily revolve around code quality and code complexity. As we’ve learnt far more in this session regarding unit testing, we’d like to implement a redesigned unit testing framework which allows us to easily test all different node member variations (2, 3, 5, 7, 9, etc. nodes). As our primary CCRD has already been completed, and we’re into the “feature adding” stage now, it’s reasonable for us to take an iteration for further testing as there is no more “must have” features of the software. |
|  | Project Plan | Update | Changing our **C-2** iteration next session to be the original C-1, which was implementing Dynamic Cluster Membership | This is a feature we’d really like to have, so we’d like to make sure it gets completed. We’ve currently got a code base at the moment which passes testing, so any changes to it should be verified to not break existing functionality, this is why we aren’t trying to introduce the new feature until after our new C-1 iteration of redesigned testing. |
|  | Project Plan | Update | Changing our **C-3** iteration next session from “Upgrade Path and Performance Analysis” to “Log Compaction” | This is a feature which we think a reasonable user of the software can expect. That after using the distributed log for a long time it does not run into file size limits. We’d like to implement this feature straight after Dynamic Cluster Membership. |
|  | Project Plan | Update | Changing our **C-4** iteration next session. We’ve added optional extra nice-to-have use cases after contingency allowance and IOCM work | We’ve identified that we’d also like to complete these extra nice to have features as part of our requirements, even though they’re low priorities. We’ve added them to the end of the iteration for in case we have time, we’re hopeful we will have the time. We’ve maintained the C-4 iteration as contingency for previous iterations as well. |
|  | Project Plan | Update | Changing our **T-1** iteration, removing the implementation of our project into an open source project, and instead we’ll more simply integrate our new features into our existing prototype application | Developing the prototype took a huge amount of effort and time, and that was for code that we had full control over and understanding of. We believe that successful reliable integration into an open source project would be exhaustive time consuming and far beyond any reasonable expectation for this student project. However we’d still like to show off our new features added this session, so we’ll simply integrate them into our existing Prototype and repurpose that program as a Demo Application of the library. We’ll publish the Demo Application open source as well. |
|  | Project Plan | Update | Changing our **T-2** iteration. Adding in finishing off the prototype integration, adding producing user documentation for library | We’re adding some contingency for completion of integrating our new features into the prototype. We’re also adding in that we should produce our public user documentation for our library (including XML documentation for publicly accessible methods) and example code in the readme.md version control file |