ClusterGit

Risk Assessment

Version 1.0

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Revision History

Date	Version	Name(s)	Description
9/26/25	0.1	Brandon Springer	Created doc
10/03/25	0.2	Sasha Tapinsh	Edited Risks
10/10/25	1.0	Sasha Tapinsh	Final Touches

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Integration Risks - Moderate

Integration between different software could potentially cause issues. Different softwares could have incompatibilities or not work well together.

- **Project Impact:** Integration incompatibility could cause the cluster to be unreliable. This would entail nodes within the cluster crashing frequently, performance issues, and storage reliability issues.
- **Mitigation Strategy:** To mitigate the risks of software incompatibility we are doing extensive research into each software we intend to implement. This will allow us to know the requirements and compatibility between softwares.
- **Contingency Plan:** If software is incompatible then we will look into similar softwares that are more compatible. We will then implement the new software to replace the incompatibility.

Storage Bottleneck - Low

Due to the large files that the cluster computer needs to handle, it will need access to a large amount of storage. As of currently the cluster has 4TB of storage using Pi Hats. The estimated amount of storage needed per semester is approximately 6TB meaning that our current storage is 2TB short.

- **Project Impact:** Not having enough storage will prevent the end user from being able to reliably store their projects within the pi cluster. This could potentially lead to projects being deleted to free space, and users being unable to upload projects. It would also prevent the replication of projects for reliable backups.

- **Mitigation Strategy:** To mitigate this issue we have acquired 2 more Pi Hats to attach more storage. This would allow for up to 4TB more storage for a total of 8TB. We have also considered getting one more Pi Hat for 10TB of storage.

- **Contingency Plan:** The contingency plan available for us is to create a Networked Attached Storage (NAS). A NAS solution is preferable due to the reliability and speed advantages presented with file management over ethernet as opposed to USB. This would allow for even more storage on top of the storage within the pis.

Outsourced UI - Moderate

The UI for this project is being outsourced to one of Professor Jay Johns' Human Computer Interaction students. This student is creating the UI as an honors option.

- **Project Impact:** The creation of the UI by the honors student could save time, however since we are not working directly with the student there could be problems

with integration and industry standards. Integration issues could waste time attempting to connect the UI to the project. If the UI does not follow industry standards it could prevent the use of the project for industry use.

- **Mitigation Strategy:** To mitigate this potential issue we will attempt to communicate with the honors student before the end of November. This will allow us to ensure that all requirements are met.

- **Contingency Plan:** The contingency for this issue would be to edit or create a new UI for the project. This contingency would take a significant amount of time, but is not an impossible goal.

Pi's Overheating - High

One possible issue with the Raspberry Pis themselves is the possibility of them overheating. This could potentially cause issues with performance, such as slower speeds and crashes.

- **Project Impact:** Overheating would make it harder to work with the Pis, and puts them at risk of long term damage. Consistent crashes due to overheating would make the Pis unstable.

- **Mitigation Strategy:** To mitigate the possibility of overheating we will keep the Pis in a cool location. We will also have an external fan pointed at the pi cluster to help with cooling. In case that the pi's still overheat, our solution should allow for self-healing, in which the LoadBalancer gives work to other nodes to make up for the reduced performance.

- **Contingency Plan:** Our contingency plan for overheating is to 3D print a case for the pi cluster that includes builtin cooling. This case will both protect the Pi's from damage and keep them cool.

Network Access - High

Getting access to the PFW network is a possible issue. This would prevent the pi cluster from accessing the internet.

- **Project Impact:** Without the internet no one will be able to access the pi cluster remotely. This would prevent users from being able to use the product.

- **Mitigation Strategy:** To mitigate this issue we are in contact with PFW IT. Through speaking with IT we hope that we will be able to connect the pi cluster to the network, and allow users to access it.

- **Contingency Plan:** The current contingency plan is to connect the pi cluster to one of the team members' home internet until we can connect it to the PFW network. This will allow us to keep working on the project without needing to wait for IT.

Hardware Failure - High

This project has a high emphasis on physical hardware, and because of this there is a possibility of hardware failure.

- **Project Impact:** Hardware failure could possibly cause one or more of the Pis to break. This could potentially cause the loss of data and progress.

- **Mitigation Strategy:** To mitigate this possibility we will be monitoring the hardware of the Pis while they are running. This will help us ensure that none of the Pis are being overworked.

- **Contingency Plan:** If one of the Pis does fail we intend to have backups of important data. If more than one Pi goes down there is a possibility of acquiring new Pis. The cluster will have easy scalability, meaning we can add new worker nodes as needed.

Scheduling and Lab Access - Moderate

This project has an important physical element that requires us to meet physically. This means that all team members must meet in the lab with the pi cluster on a regular basis. Due to busy schedules this could cause scheduling issues.

- **Project Impact:** Not being able to meet physically and consistently could cause setbacks in the development of our project. This could cause us to miss deadlines or not meet our goals.

- **Mitigation Strategy:** To mitigate this our team has communicated and set up a scheduled lab time each week. This will allow us to meet once a week physically with the pi cluster. We also have a separate meeting time outside of the lab.

- **Contingency Plan:** If one or more of us is unable to make it to a meeting we have implemented discord as a way to communicate with each other. This will allow us to keep each other in the loop and meet virtually if necessary.

Scope Creep - Moderate

Scope creep entails focusing on optional features before finishing requirements. Optional features include things such as setting up a NAS, and creating a 3D printed case for the cluster.

- **Project Impact:** Scope creep has the potential to cause delays in minimum requirements. This could cause the project to be unusable and not meet the sponsors expectations.
- **Mitigation Strategy:** To mitigate this possibility we will focus on implementing all requirements first before working on stretch goals. We will also use clear communication to decide when we can and can not focus on optional features.
- **Contingency Plan:** If requirements are not met due to scope creep then we will switch our focus from optional features to focus on requirements.