***Sprint 1 - Endurance Design Document***

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**November 8, 2023**

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[1.1 Project Overview 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616853)

[1.2 Purpose and Scope of this Specification 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616854)

[**2.** **PRODUCT/SERVICE DESCRIPTION 3**](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616855)

[2.1 Product Context 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616856)

[2.2 User Characteristics 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616857)

[2.3 Assumptions 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616858)

[2.4 Constraints 3](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616859)

[2.5 Dependencies 4](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616860)

[**3.** **REQUIREMENTS 4**](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616861)

[3.1 Functional Requirements 5](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616862)

[3.2 Security 5](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616863)

[*3.2.1* *Protection 5*](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616864)

[*3.2.2* *Authorization and Authentication 6*](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616865)

[3.3 Portability 6](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616866)

[**4.** **REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF 6**](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616867)

[**5.** **SYSTEM DESIGN 6**](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616868)

[5.1 Algorithm 6](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616869)

[5.2 System Flow 6](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616870)

[5.3 Software 6](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616871)

[5.4 Hardware 6](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616872)

[5.5 Test Plan 7](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616873)

[5.6 Task List/Gantt Chart 7](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616874)

[5.7 Staffing Plan 7](https://d2l-docbuilder-prod-us-east-1-converted.s3.amazonaws.com/6614158d-abf7-4283-9159-c5aabfd3ba72/123b9516624b4a2a9f37286394293e95.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=ASIA5AF533RD3TO4HBO6%2f20231025%2fus-east-1%2fs3%2faws4_request&X-Amz-Date=20231025T202528Z&X-Amz-Expires=5460&X-Amz-Security-Token=IQoJb3JpZ2luX2VjEDsaCXVzLWVhc3QtMSJFMEMCHyjjArCOvQ9HU6DF5rHB5UcpJsmXg1nrze630ARfH8oCIBqUhU3LmtL4dHavC5nL6gG4pkLRjFkWcxM6b6KpF2nrKv8DCGQQBBoMODkzNzUxMzg1MTU5IgwA4xpvj0CSRIrjEdgq3AN91kLIofd17y%2f%2b1QyLQ1mDrOUZhBrX%2f8HSQ3vgrYgOmJ0pOH54MoHEoE%2bq9pkFMuLfl1Kuqo%2bcT%2bNrw4pyxg3z2BBppMAbArZpMOeWbDT2kOw7mQKN0%2bZEXeIczHSr2vQZH8o3gPiE1ohglMM2OY7WEuQKuaABaKlhV4pGfmytyhviiSSlw4ed%2fGPzbh34FVbA1OelZceIA3Z7EtXOTHojynJ8BVozAZlGkka7H1N8elJtpZJ6by84HZMbifezfVWke2rdTMDOPeSdDajCdP9pr0M3p%2bL8qDP9VW%2bAZWUuSm7WheSLCr80lZsR4eCmJz%2bKn%2fh91IJUmmeLjj8zfxSqu2TFkvo6bXJQXfDMzi95lZIo2pFRlblze2ZQDeM2%2bQhCOa0v60aGwRCiCbDRyfO1gJpD64EV5Xo9bh1rbhrVH3MFSkU4yodal%2f2F6SHAtWcPF0AP%2fEDd5AmtOG37Fkw09gNGkLHHuE%2ft0pGFojuh5Mstrcixp3eknYTjUtTwoZA84qDPI2fdqkm8ZXYrd%2blJCBycgS9iOMeuWtUMAQB9T%2f0c19vyejlUwRXWYVleuK3AAVavHGoih11F7Fj7NgmotZ8UW4WH1H3kf%2focrthCdJVrgt%2bZgWJzl2Wf5TDjyOWpBjqnAdbsNbEapRf9xggyQjRnaA7Sv%2bLsx0h3UdoYBZQf0vmmuUOtKp8SuqH4OdMLiNX0ZNIx0uhbPGDboLSkDK1SHfDlldlBsfENul7sMMMfpOvpUsZ2s5YbDARuhyB0L%2bEOHSNU4AjS8HU6EEzb4SGmsJq932oPHMBXbL%2fluYhNkpDMD1PqN81pkEWplgSH9xllnObGhBn%2f1Dki6BDqDb88t2%2brGZADpQMM&X-Amz-Signature=6ce8e006864d58c9dd11e7240fd644a99801aacb530d87d3ef7d2f2afe8f9fa3&X-Amz-SignedHeaders=host#__RefHeading___Toc21616875)

# **1.Executive Summary**

## ***1.1Project Overview***

The CS104 Robotics Triathlon project consists of three different parts. For the first sprint, Endurance, the robot (Sphero) must successfully travel around the periphery of HH208. As the robot starts from the yellow square with the blue tape, it must have a green light on and speak ‘ready, set, go’. Then, at the end, stop with a red light and speak I’m done and I need water’. Robot must travel to each of the yellow floor tiles and turn right at the center of each tile. Robot must return to it’s starting location. Robot should not collide with any objects as it goes around the room. Points deducted if the robot does not light and speak at start and finish, if it collides with anything, or if it does not finish in the square where it started. (You may scale down the course for this sprint if space is an issue).

***1.2Purpose and Scope of this Specification***

**In scope**

This document addresses requirements to complete the Endurance project:

* Modification of processing for the robot to comply with its trajectory.

**Out of Scope**

The following items in Endurance project are out of scope:

* Ensuring that the robot precisely tracks the blue tape, rather than staying an inch or two away from it as it navigates the course.

# **2.Product/Service Description**

This product will work effectively if it does not interfere with chairs, tables, people, etc. If the floor is changed in any way then the product cannot work to the best of its abilities. In most cases though, the product will work as expected if the path is not affected drastically.

## ***2.1Product Context***

Sphero is a robot, meaning it relates to other robots. It is controlled remotely like other robots, meaning that this product is like other products. Sphero is self-contained because it contains everything in itself to work. Sphero’s interface works with other related systems.

## ***2.2User Characteristics***

Gil Eckert, M.S. is a Specialist Professor at Monmouth University. Professor Eckert has an extensive background in technology management and consulting, particularly in the fields of education and medicine. He has experience in developing, marketing, and providing support for software applications in these sectors. Additionally, he has created data pathways to facilitate accreditation processes at the university level.

## ***2.3Assumptions***

Some issues that could interfere with the requirements could be issues with Sphero Edu, broken robot, or an obstructed pathway. We feel like we are educated on Sphero Edu enough to complete the coding. We also have checked for classroom availability to be able to complete the test.

## ***2.4Constraints***

Constrain the design options, including

* Battery life of robot
* Limited availability of the room
* Knowledge of Sphero Edu
* Access, management and security
* System resource constraints: limits on disk space or other hardware limitations

## ***2.5Dependencies***

* The block programming on Sphero must be completed
* The robot Sphero
* The space (room HH208)

# **3.Requirements**

## ***3.1Functional Requirements***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| ENDUR\_01 | Robot must successfully travel around the classroom. A clear path will be provided from each outside wall. | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_02 | Robot will start from the yellow square with blue tape. | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_03 | Robot should start with a green light and speak ‘ready set go’; | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_04 | Robot must travel to each of the yellow floor tiles and turn right at the center of each tile. | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_05 | Robot must return to its starting location. | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_06 | The robot will stop at a red light and say ‘I’m done and I need water’. | Points will be deducted | 1 | 11/7 | Approved |
| ENDUR\_07 | Robot should not collide with any objects as it goes around the room. | Points will be deducted | 1 | 11/7 |  |

## ***3.2Security***

Keep your robot safe, don't put it in dangerous places or situations. Keep your Sphero and Github login safe, do not share your information.

### **3.2.1 Protection**

After installing the Sphero app, there will be two login options: school and home. In the school section, you can choose to join as a student using a class code, become a teacher to create and manage a class, or simply dive into programming without signing in immediately. For the home section, logging in is possible either through email or Apple sign-in.

### **3.2.2 Authorization and Authentication**

Consider using standard tools, connecting your number, email, or app.

## ***3.3Portability***

Portability was a important factor in this project as we needed to transfer information from our computer to the robot so that it could work.

* Use of a proven portable language;
* Use of a particular operating system; Sphero And Github
* The need for environment-independence - the product must operate the same regardless of operating systems, networks, development or production environments.

# **4.Requirements Confirmation/Stakeholder sign-off**

Include documentation of the approval or confirmation of the requirements here. For example:

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees (name and role)** | **Comments** |
| 11/07/23 | Gaby, Bailey, Angela | Confirmed all requirements |
| 11/08/23 | Gaby, Bailey, Angela | Confirmed all requirements |

# 

# **5.System Design**

## ***5.1Algorithm***

● Set robot’s light to green

● Robot speaks “Ready set go”

● Set robot to travel forward until it reaches the first checkpoint

● Set robot to stop at first checkpoint

● Robot turns 90 degrees to the right and continue to travel to the next checkpoint

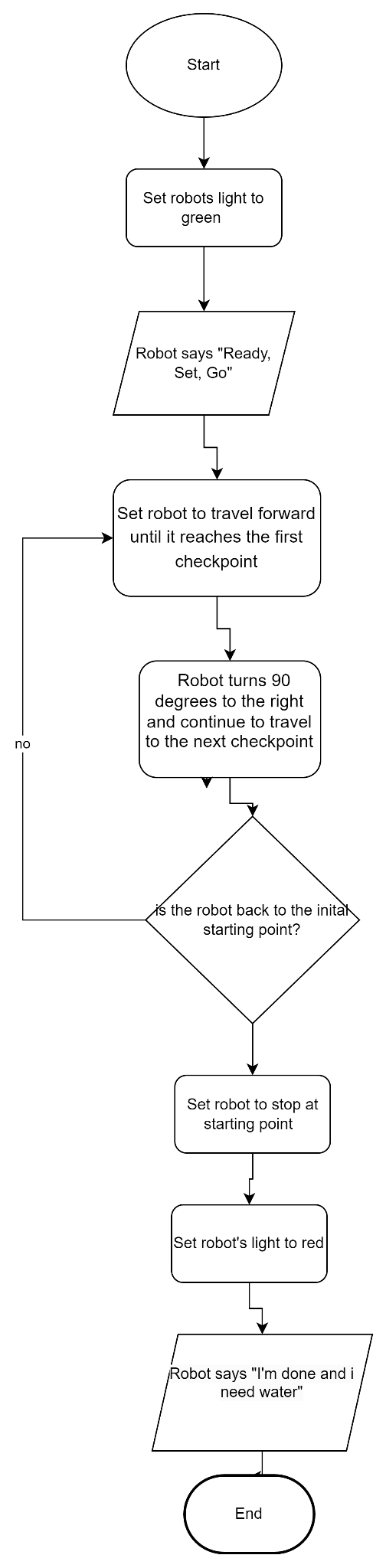
● Repeat steps 3-5 until robot has returned to its initial starting point

● Set robot to stop at starting point

● Set robot’s light to red

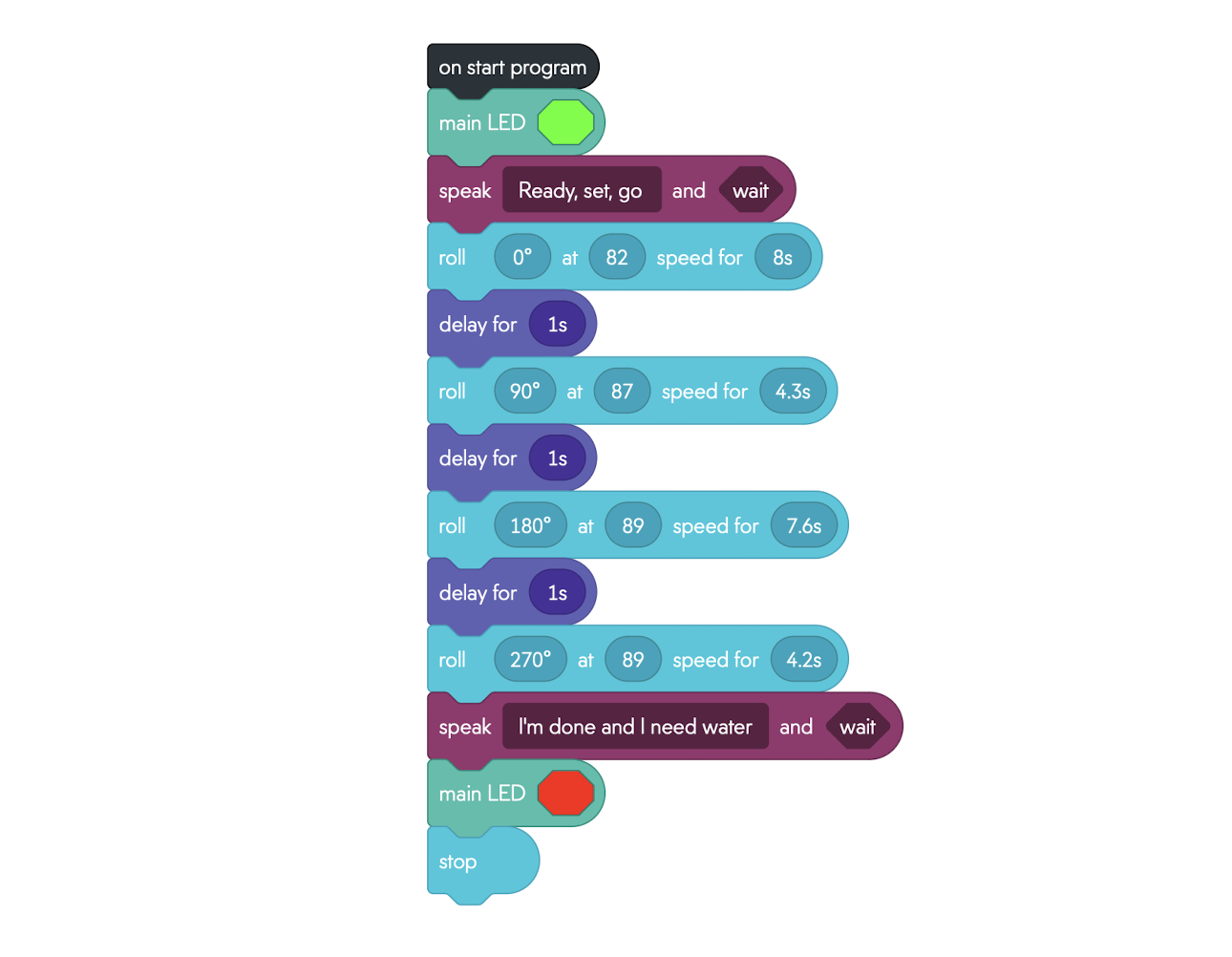
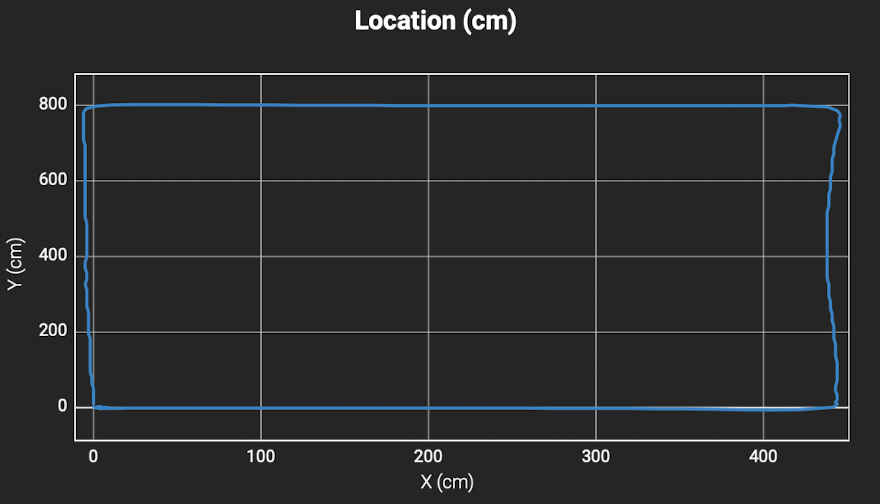
● Robot speaks “I’m done and I need water”

## ***5.2System Flow***



## ***5.3Software***

The block code written on the Sphero app or website was the software used to develop and deploy this application.



## ***5.4Hardware***

The hardware used to develop and test this project was macOS and Windows

## ***5.5Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Correct travel distance until the first checkpoint | 11/7/23 | Robot travels the correct amount of distance and stops at the first corner. | Robot stopped two inches short of the first checkpoint. | Angela | Fail |
| Correct travel distance until the first checkpoint | 11/7/23 | Robot travels the correct amount of distance and stops at the first corner. | Robot traveled the correct amount of distance and stopped at the first corner. | Angela | Pass |
| Turn at first checkpoint and correct travel distance until the second checkpoint | 11/7/23 | Robot turns at first checkpoint and travels the correct amount of distance and stops at the second checkpoint. | Robot traveled the correct amount of distance and stopped at the second corner. | Angela | Pass |
| Correct travel distance until the third checkpoint | 11/7/23 | Robot travels the correct amount of distance and stops at the third checkpoint. | Robot traveled further than the correct amount of distance to the third checkpoint. | Angela | Fail |
| Correct travel distance until the third checkpoint | 11/7/23 | Robot travels the correct amount of distance and stops at the third checkpoint. | Robot traveled the correct amount of distance and stopped at the third checkpoint. | Angela | Pass |
| Turn at third checkpoint and correct travel distance until the last checkpoint. | 11/8/23 | Robot turns at the third checkpoint and travels the correct amount of distance and stops at the last checkpoint. | Robot turned, then traveled the correct amount of distance and stopped at the last checkpoint | Bailey | Pass |
| Video filming | 11/8/23 | Robot completes the course | Robot completed the course | Bailey | Pass |

## ***5.6Task List/Gantt Chart***

## 

## ***5.7Staffing Plan***

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Role | Responsibility | Reports To |
| Bailey | Github owner | Upload videos | All group members |
| Angela | Programmer | Create block code and test | All group members |
| Gaby | SDD creator/editor | Create and edit document | All group members |