You are starting the process of estimating the *project length*, *complexity* and *resources required*. The details are:

- 200 User Stories
- The application is to track automated farming equipment usage and vegetable growth data
- Public Internet-facing application
- Users require 2 step authentication including User ID/Password and text messages
- Data must be secure

You sized the project and have decided on the following ***resources***:

- Decided to use Scrum
- Two scrum teams - 6 total developers
- 2 QA and a lead developer/architect
- 4 months of development time
- Decided to use Kubernetes and containers
- Decided to deploy on AWS using Amazon ECS

To further understand the businesses ***availability requirements***, you met again and they would like the following:

- 99.999% availability
- High availability
- Ability to handle failovers
- 30 minutes of downtime per week on Sundays for maintenance
- Encrypted Data
- Daily backups

Questions: — Must back up your answers with facts

1. How much additional time is required?
2. What application deployment changes are required?
3. What additional team resources if any are required?
4. How would you calculate the additional cost to the project?

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1. Additional time:
   - The additional availability requirements (99.999% uptime) may require additional time to implement and test failover mechanisms and high availability solutions. This could involve designing and implementing load balancers, setting up multiple instances of the application in different regions, and testing different failure scenarios.
   - The requirement for encrypted data may also add additional time to the project, as it will require implementing and testing encryption for data at rest and in transit.
   - The requirement for daily backups may also add additional time to the project, as it will require setting up a backup process and testing the restoration of data from the backups.
2. Changes to application deployment:
   - In order to meet the high availability and failover requirements, it may be necessary to make changes to the application deployment. This could include setting up load balancers to distribute traffic across multiple instances of the application, and configuring the application to handle failovers gracefully.
   - It may also be necessary to make changes to the application deployment in order to support encrypted data and daily backups. This could involve implementing encryption and backup solutions within the application itself, or integrating with external tools or services to handle these tasks.

3. Additional team resources:
    - Depending on the complexity of the additional requirements, it may be necessary to bring on additional team members with expertise in areas such as high availability, encryption, or backups.
    - It may also require expertise in cloud infrastructure and deployment tools, such as Kubernetes and Amazon ECS.
    - In order to determine the specific additional resources needed, it will be necessary to assess the specific tasks and activities needed to meet the availability requirements and handle failovers, and then determine the type and number of resources needed to complete those tasks. This can be done using techniques such as expert judgment, workload analysis, or more formal estimation methods such as bottom-up or top-down estimation.
4. Cost calculation:
    - To calculate the additional cost to the project, it will be necessary to consider the additional time and resources required to implement the additional requirements. This could involve estimating the number of additional development hours needed, as well as any additional costs for tools or services required to support the requirements. It may also be necessary to consider any potential impacts on the project schedule and budget, such as the need to extend the project timeline or bring on additional team members.
    - It will also be necessary to account for any additional costs for infrastructure and support, such as additional servers or licenses for cloud services. For example, if the additional effort required for the project is estimated to be 200 hours for developers, 100 hours for QA, and 50 hours for operations, and the cost per hour for each type of resource is $75 for developers, $50 for QA, and $100 for operations, the total additional cost for labor would be 200 * $75 + 100 * $50 + 50 * $100 = $22,500. If the additional infrastructure and support costs are estimated to be $10,000, the total additional cost for the project would be $22,500 + $10,000 = $32,500. This estimate can be refined and updated as the project progresses and more information becomes available.