Hypothetical Scenario Instructions

For the hypothetical scenario described below, the candidate will have **two hours (120 minutes)** to read, evaluate, and document a high-level architectural solution. The solution should:

- Address where the Force.com platform will and will not be used.
- Describe how the Force.com platform portion of the solution will interact with other systems needed to complete the solution.
- Identify any potential key risk areas.

The candidate should target the presentation to a technical Information Technology (IT) architecture audience. In cases where requirements are not explicitly stated for the scenario, the candidate should use his or her best judgment and make appropriate assumptions based on the information provided. The candidate should indicate to the review board any assumptions that were made when designing the proposed solution. The candidate will not have an opportunity to ask clarifying questions related to the hypothetical scenario.

The candidate will be evaluated on his or her ability to assess the scenario requirements, design a solution, communicate the proposed architecture, and justify the design decisions. The candidate will not be evaluated on the tools used for the presentation.

Project Overview - Universal Racing (UR)

Universal Racing (UR) is an international company which organizes adventure races - a unique combination of an obstacle course and road race - where a competitor is provided with a compass and topographic maps marked with waypoints with the goal of reaching all the waypoints in the least amount of time. UR also fulfills a socially minded mission: all racers aiming to raise money for their designated charity or nonprofit.

UR would like to update their disparate systems and processes to better support the organization of races, making it easier for runners to raise money, for charities to interact with runners, and for a 3rd party logistics partner to run the races. In addition to the above, UR would also like to add a near-real-time feature to their website whereby the general public can monitor racers progress. This will be tracked via Radio Frequency Tracker (RFID) that the runners will wear along with their Racing Bibs (the printed sheet with the runner's number) as they pass the waypoints.

UR currently operates in North America and Europe, and plan to expand to South America and Asia in the next few years. They would like to ensure that they can streamline their processes across the various regions, and easily collaborate with each other. UR would like to convert the North American region systems first due to their limited budget. The funding of future projects hinges on the success of the North American deployment.

The following Universal Racing employees will be using the new system:

- Territory Race Coordinators - responsible for making sure races go according to plan in a specified territory (i.e. East Coast, Midwest, West Coast)
- Territory Route Leader - responsible for plotting the race route and establishing waypoints for the Radio Frequency Trackers. Reports to the Territory Race Coordinator.
- Regional Managers - responsible for all employees and charities in all the territories in a geographical region (i.e. the entire US)
- Customer Support - responsible for issues runners might have with signing up, donors might have with sponsoring, and other miscellaneous issues.

Universal Racing has identified several external users who will also be using the system:

- General Public / Anonymous Unauthenticated Users - any random person not otherwise identified, i.e. family and friends of Racers
- Racers - people who run the race
- Charity Personnel - representatives from the organizations runners are raising money to help. They handle registering a charity with UR
- Adventure Trackers, Inc. - a 3rd party race logistics firm who handles the printing, shipment, and fulfillment of the runner's items (Racing Bibs, Radio Frequency Tracker)

Current Systems

- UR has an internal Active Directory that stores the internal employees' credentials.
- UR has an internal LDAP that currently stores Partner and Racer credentials.
- UR have home grown Racer Databases that stores racer/charity information, pledges, demographic, and race history. As they began expanding, UR was forced to create multiple "siloed" Racer Databases to accommodate the performance issues. They segregated the Racers records in the databases by the territories, and as a result, they encountered large amount of duplicate records between the Racer Databases as Racers competed or moved between the different territories. The 3 Racer Databases have a combined 250,000 racers records, which UR suspects 20% of it are duplicates. UR would like to retire them and move to the Salesforce Platform. They are accessible via SOAP APIs.
- UR has a home-grown Tracker Database that stores the Radio Frequency Tracker (RFID) information and tracks its associated GPS coordinates for each race. It is accessible via REST APIs.
- UR connects to a third-party cloud-based application, the International Adventure Racing Association (IARA), that maintains a registry of all the racers around the world who have participated in races organized by UR and its competitors. IARA stores the placement of the racer in each race participated. The application supports both SOAP and REST APIs.
- UR uses an on premise Credit Card Payment Gateway System, DashPay, to process credit card payments for their various internal and backend systems. It stores account information and allows racers to safely store their credit card information for future registrations. It is accessible via SOAP APIs.

- UR connects to a partner system, Adventure Trackers, via a SOAP Web Service to process and ship the Radio Frequency Tracker (RFID) and Racing Bibs.

Business Process Requirements

Universal Racing would like to automate and streamline the following business processes in the new system:

Race planning and Racer Registration

- UR would like the new system to be the single system of record to plan all the races across the 3 territories in the US Region. They average 20 new races per year in the US.
- During the planning stage, UR would like the Territory Route Leaders to create a race record when they come up with an idea and location for a race.
- They would like the Territory Route Leader to have a mobile app where they can walk the route and store the Race Waypoint into the system using the GPS coordinates of the location. Each time they capture the location and save it, it would increment the location order number sequentially. Each race typically has 100 Race Waypoints.
- Once satisfied, the Territory Route Leaders would then submit the race idea/record to the Territory Race Coordinator with the recommended registration fee so that the Race Coordinator can work with the city/state officials to secure permission to host in the area. Once allowed, the race status is set to 'Open' where everyone can register for it.
- UR would like to provide their Territory Route Leaders the ability to do ad-hoc reporting and analysis of current and historic race and pledge data to help them quickly decide whether to approve a new Race. As they constantly are travelling between the different territories, they should be able to do so from a mobile device.
- Race coordinators, route leaders, and regional managers should be able to access racer, race route, and start group information from the mobile app
- Racers are able to set up a profile on Universal Racing's registration portal found on UR's website. Racers can choose to create a username and password, or utilize their existing social media credentials from Facebook or Twitter.
- When a racer's record is created, the system should connect to the International Adventure Racing Association's (IARA) API and see if it can associate the newly created Racer record to one of the existing 200,000 racers record in the IARA database based on the racer's first name, last name, and email address. If there is a match, the IARA record identifier should be stored on the racer's record in SFDC so it can be later retrieved on demand.
- Universal Racing would like to minimize the creation of duplicate racer information. UR would like the system to check whether the user's first name, last name, and email address is in the system, and if so, ask the user if any of those records presented. If the user selects a record, a password reset would be initiated for the email address displayed. Otherwise, allow for the creation of the user.
- Upon creation of the racer's user account, the racer can search for upcoming races through the GUI website or through a mobile app that can be downloaded via the Apple AppStore or Google Play.

- The mobile app would also allow the racer to update their personal information, register for a race, view their race information, their route, and their pledges.
- Each published race shall display the registration status. The Territory Race Coordinator will set the maximum capacity for the race, which typically is 5000 racers per race. Once there are enough racers, the registration status should be set to 'Closed'.
- Racer should be able to register for a race, state his competition level (couch potato, novice, super athlete), and pay for the registration fee. If they had previously saved their payment info, they can choose to use it or enter in a new payment method.
- Racer should be notified immediately if payment was unsuccessful so that they can enter in a new payment method.
- Upon successful registration, racer would get an email confirmation for the payment and the race date. He will also get a unique id that friends and family can enter on a website that will link to the racer to allow them to provide a donation or watch his progress on a topological map.
- Racer would be able to select and default where all his charity pledges would go to.
- Upon successful registration, system shall check IARA to see if he has raced more than 5 times the past 2 years. If so, send an invitation to the racer asking if would like to participate in a special Premier Race Start Group with other elite racers. As an incentive, UR would match the total pledge amount for all the racers that participate in that premier race.
- Racers should be able to ask questions to forums or search the site for UR materials on upcoming races, race details, race rules, how to prepare for a race, etc. These materials should be available in multiple languages.
- Racers can raise requests to customer support should they not received their Racing Bib or RFID, they're defective, to cancel their registration, or for any general questions.
- A racer can cancel his registration by clicking a 'Cancel Registration' button on his Race Entry record. This should initiate a cancel order to not ship the Racing Bib and Radio Frequency Tracker. If the items have not been sent out yet, the racer would receive a full refund of his registration fee. If the items have been sent out, only half the registration fee will be refunded.

Racer Tracking and Charity Pledges

- UR would like a webpage for the general public where they can submit a donation or watch a racer's progress on a topological map. They envision that this page can take the unique id provided by the racer to friends and family to bring up the racer's limited info (name, pledge goal, charity selected by the racer) and a topological map. If the unique id was not available, the public can search based on first name, last name, and the race.
- A user viewing the profile will be able to enter a pledge amount and be redirected to DashPay for processing. Upon completion, the user and Racer will receive an email confirmation of the pledge. User should be notified immediately if payment is not successful.
- Each racer typically receives 50 pledges per race.
- During racetime, the racer's page will display a near-real time topological map of the racer's progress along the race route along with the times they crossed the Race Waypoints.

Race Logistics

- Upon successful registration, a shipment request is created to Adventure Trackers to ship a Racing Bib and Radio Frequency Tracker to the racer. Adventure Trackers will provide the Racer Bib Number, Radio Frequency Tracker ID, and shipment tracking number for each racer.
- The system should display the latest shipment tracking status based on the shipment tracking number.
- 10 days prior to race, the racers must be broken up into Start Groups based on the pace time (competitive level) each racer provided during registration. If the racer had opted to participate in the Premier Race, he should be placed in the Premier Race Start Group. Each Start Group shall not exceed the capacity number set by the Territory Race coordinator, which is defaulted to 50 racers per group. Racer shall receive an email notification notifying him of Start Group location and start time.
- Racers wear their issued Radio Frequency Trackers on their shoes. As they pass RF Waypoints along the race route and walk over the RF Waypoint (virtual 'check-in'), their tracker id, location, and time are automatically transmitted to a central Tracking Database.
- The 'virtual check-in' information for the racer should be plotted in near-real time on the topological map on the racer's website when the page is refreshed.
- A day after the race has been completed, the system shall send the charity organization a payment through DashPay to the bank routing numbers stored for the charity organization.
- Due to regulatory requirements, UR would need to send a pre-formatted document comprising of the donation amount, race, and date once the payment has been submitted. This should be emailed to the primary designated Charity Personnel for the Charity, and should be accessible in the system for viewing/downloading at any time. The size of this document is anywhere between 2-3 MB.

Charity Application and Reporting

- There are 400 Charity organizations that UR supports. Charity organizations that are not in the system shall be able to apply through a web url or through email
- Territory Race Coordinators would review the application for completeness and verify that they are a legitimate 501c non-profit organization. Once validated, the Regional Manager would review and signoff on the Charity organization creation in the system.
- Upon creation of the account, the designated Charity Personnel would receive an email notifying him of the status along with credentials to sign onto the system.
- The designated Charity Personnel shall be able to create user accounts for other Charity Personnel, and be able to assign the same privileges or limited read-only views to them
- Charity Personnel should be able to ask questions to forums or search the site for UR materials on upcoming races, race details, race rules, how to prepare for a race, etc. These materials should be available in multiple languages.

Customer Support

- Internal customer support can take donations requests over the phone or log complaints about the race
- Complaints created for a race would be assigned to the Territory group (Territory Route Leader, Territory Race Coordinator) responsible for the race
- Any request where the racer did not receive their Racer Bib or Radio Frequency Tracker should be sent to the Territory Race Coordinator immediately and must be resolved within 1 business day. If not, the Regional Manager should be notified.
- Registered racers and Charity Personnel shall be able to chat with agents.

Data Migration Requirements

- UR would like all the racers and charity accounts migrated out of the Racer Databases to the new system. They only require 5 years worth of historic race information and the final total amount of pledges/donations raised by the racer for the specified charity for each race in the system. Data should be de-duplicated and standardized prior to loading.
- Each racer record migrated should be checked and populated with an IARA record identifier.

Accessibility Requirements

- UR would like their system to be global and support local languages.
- UR's staff require single-sign on based on their internal Active Directory system. Staff must also be automatically provisioned and de-provisioned into the new application.
- During planning, when the Territory Route Leader create the race record and set the status to 'Draft', only the Territory Route Leader and his respective managers can see it. Once the race status is set to 'Open', everyone can view it.
- Only the Territory Route Leader who created the race and his respective managers can edit the race registration fee while it's in 'Draft'. Once 'Open', no one should be able to edit the race registration fee.
- During planning, when the Territory Route Leader plots the Race Waypoints using the mobile app, only the Territory Route Leader and his respective managers can see it. The race waypoints are only made visible to everyone on the day of the race to avoid anyone trying to 'cheat'.
- Only the Regional Managers can edit the charity accounts within their region; all others can view all Charity information.
- New racers' username/password who do not use Twitter or Facebook shall be created in the current LDAP system.
- Racers should be able to view their racer info and previous races (race name, organization that sponsored, racer's race results) from IARA

- Racers should be able to search for published races in any region within the system.
- Racers can only see and update their own personal data (phone number, email address, etc.)
- Racers can only view pledges for their own race entry, and can select the charity that it benefits
- Racers can see all members of all Race Start Groups
- New Charity Personnel username/password shall be created in the current LDAP system
- Charity Personnel shall be able to login to view their donation/pledge reports for only their Charity organization
- Charity Personnel should not be able to view any of the Racer details or any of the racer's specific pledges from previous races.
- The designated Charity Personnel shall be able to view information about the organization, and update certain information such as phone number, website, or email address. For all others changes (i.e. bank routing number and mailing address that's stored in DashPay), the designated Charity Personnel must raise a request to update.
- The pre-formatted document containing the pledge/donation amount, race, and time to the Charity should be accessible by that Charity.
- Internal customer support can view and respond to all requests created by Charity Personnel and Racers, regardless of the region or territory
- Internal customer support have ability to view the shipment status of the Radio Frequency Tracker and Racing Bib
- Internal customer support can view all racer registrations
- Internal customer support can see all pledges
- General public can make a pledge to any racer on the public webpage by 1) entering the unique id or 2) searching for a racer's name and the race name. Can see only limited information about the racer.
- General public can view the progress of any racer during the race from that public webpage.
- Due to PCI compliance, racer credit card information and Charity bank account number can only be stored in DashPay and not in the new application

Reporting Requirements

- Racers should be able to see a report of the races run, charities sponsored, and total amount raised over the last 5 years.
- Going forward, Charities should be able run a monthly and yearly report on pledge amounts by races. They are particularly interested in which racers bring in the most amount over the course of the year, as well how many of the pledges were over $100.
- UR Territory Race Coordinators and Regional Managers should be able to run reports and perform ad-hoc analysis for all historical and current data, such as showing summarized monthly funds raised by geography or by race type

Project and Development Requirements

- UR, while deeply committed to how this new technology and processes can help support goals, is more focused on racing and raising funds for charity than IT, and therefore readily admits to being disorganized. UR needs guidance on how to tackle this project in a successful manner
- UR would like to debut/pilot this new system in a racing series which begins in 6 months in the US. They would like to rollout to Europe within 12 months.
- UR have developers in San Francisco who currently are accustomed to making updates manually to different environments as needed (missing code, bugs, missing reference data) through the method/tool of their choice. UR would like recommendations on whether this is best practice and optimal.
- A second development team is being brought onboard in Romania to work on European specific regulatory requirements. UR would like guidance on how to make the most of this new team and ensure coordinated forward project movement with the team in San Francisco.
- Given this involves money and charitable giving (with noted US tax authority implications), UR is committed to ensuring that those regulatory requirements are met for the pilot
- As DashPay serves numerous other backend systems for UR, any changes must go through rigorous testing
- UR requires that the new system is easy to use and fast for the users, as future funding and deployments depend on the success of the pilot
- UR would like a comprehensive testing, environment planning and deployment strategy based on the new system architecture