VIRTUAL DESIGN MASTER

SEASON 4: CHALLENGE 1
DESIGN DOCUMENT

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REVISION HISTORY

DATE	REV #	AUTHOR	NOTES
June 28, 2016	1.00	Luis Ayuso	Initial document and design draft

1. EXECUTIVE SUMMARY

1.1. PROJECT OVERVIEW

In season 1, the world was overrun by zombies and infrastructure was scavenged to build and repair communication. As time moved forward, season 2 saw the move of earths remaining population to the moon. This planned worked for quite awhile until the population density on the moon grew to an extreme. The answer then was simple, move to Mars. Because it was obviously that simple.

After successful colonization of Mars in Season 3, the race to develop an anti-virus was on. Each season bringing greater and more efficient infrastructure designs to rebuild the human races way of life. Thankfully the anti-virus worked! So we are heading back to earth to rebuild and repopulate.

This season, we need to greenfield all new global and lunar infrastructure. This includes all communications and data networks connecting them together. Luckily our billionaire friend is footing the bill and helping get it up and running as soon as possible. This is likely because he misses his Picasso paintings he left in his home in California, and longs for Arts, Culture and the dangers of space exploration to be behind him. Who are we to judge?

1.2. INTENDED AUDIENCE

These documents and materials are to be used for an implemented by the infrastructure engineering teams based both on Earth and on the Moon.

1.3. SCOPE

1.3.1. HARDWARE

This project will consist of hardware that is old, current or in development. Our manufacturing, R&D and automation processes have greatly improved despite our limited resources. Research into robotics and machine learning have yielded great results in the manufacturing of hardware. Any and all hardware that can be conceived can be created.

This will provide fast machine manufacturing for any systems or hardware that will be deployed.

1.3.2. SOFTWARE

Due to the laws of robotics, people like Elon Musk and his issue with true AI learning, scientists not wanting to welcome Skynet through code created by machines, we are limited in resources available for software. As such, only cloud software suites that are currently available can be used.

The reason behind this is that Software Engineers are not always the fastest runners. We lost many of them to zombies and more to those who tried to build machine driven code, since they still ended up building a Skynet in their air-gapped labs. Unfortunately, they died by their own creation.

But we rebuild! A new generation of genius programmers have come up through the ranks. Their task is to support our deployments through security patches and firmware updates since we don't have enough resources to work on future features. One subset of programmers will support the software and the others will support hardware.

1.4. REQUIREMENTS

The following requirements were set forth in the Project Charter/Challenge:

- Multi-Site environment
  - Primary Site: Earth
  - Secondary Site: Moon
- Critical Applications to Support
  - HumanityLink
    - 3x Front End Web Servers
    - 1x Database
    - 2x Application Servers
    - Performance Priority: Critical
  - Other Systems
    - 25x Web Servers
    - 5x Databases
    - 10x Application Servers

1.5. PROJECT INSIGHTS

1. Design decisions need to be centered around the idea of R.A.M.P.S.:

   Recoverability, **A**vailability, **M**anageability, **P**erformance and **S**ecurity

2. CONCEPTS AND IDEAS

2.1. LONG RANGE COMMUNICATIONS

Before the zombie attack, NASA was working on a laser based communications system called the Lunar Laser Communications Demonstration (LLCD) which boosted communication bandwidth between the Earth and Moon to 19Mbps. This technology used multiple beams within a region to ensure that atmospheric conditions did not prevent the lasers from reaching the target receivers. This allows us to move away from radio based communications via satellite and bring the longest round trip time for a packet from a point on earth, to the moon and back to a maximum of 2.766 seconds.

Additional detail will be provided further in the design documentation as to the locations and specifics of this system.

2.2. HYPER-CONVERGED INFRASTRUCTURE

In consideration of deployment geography and implementation time, the design will be completely run on Hyper-Converged Infrastructure. The intention is to put as much of the infrastructure behind API’s as possible to allow for rapid deployment and changes to decrease the need for configurations beyond Day 1.

2.3. DEPLOYMENT & IMPLEMENTATION

Time-to-Value is extremely important for getting this infrastructure up and running. In an effort to speed up deployment of the infrastructure as well as ancillary services and applications, EVO SDDC will be used. This will put further constraints on vendors available to use for networking, but adds additional automation in standing up the environments.

2.4. PHYSICAL INFRASTRUCTURE

All efforts must be made to consolidate as much of the virtual environment into as small of a deployment as possible, due to limitations of space in certain locations. All hardware will be standardized across all deployments.

3. DATA CENTER ENGINEERING

3.1. DATA CENTER ENGINEERING

3.1.1. LOCATION

Before the zombie attacks, earth had a large fiber optic backbone consisting of multiple Tier 1 ISP's and even more Tier 2 and 3 providers. Proximity to the Tier 1 hubs is a priority. These locations will contain the necessary physical infrastructure for housing data centers. Their construction, should it still be standing will also provide optimal physical security, given the nature of their previous use in supporting the worlds internet backbones.

3.1.2. POWER

The size of this project is not large enough to require a major overhaul of a buildings power systems and can also be provided for by a relatively small generator. Though, there will be an initiative to make sure all power decisions not only meet current demand, but can also scale up to 3 times our current needs.

Because we will be using locations previously owned an operated by Tier 1 ISP's, which resided in areas with access to multiple grids, we have the ability to provide multiple grid based sources before having to consider generator power. Locations with access to hydroelectric power are preferred.

Uninterruptable Power Systems will be used in all locations. There must always be enough battery power to allow for 12 hours of uptime. Any additions to the infrastructure must be also met with additions to battery requirements.

3.1.3. COOLING

While away, R&D into microchip architecture has helped build more efficient chips and systems that require less than half of the cooling power needed before. Currently in development are chips that can run at peak in an environment that is considered "room temperature" or 77 Degrees Fahrenheit.

Despite our advances in efficiency, there will still be multiple stages of HVAC systems available to provide for N+1 cooling.