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PREPARING THE RECEIVING DATA CENTER: EVALUATING FACILITIES AND ENSURING A FLUID TRANSITION

Introduction

Linden Lab, maker of Second Life and Second Life Grid (www.secondlife.com), is a virtual world technology company. To host the Second Life system, Linden Lab maintains datacenters in California, Texas and Arizona. These datacenters host over 7,000 computational and simulation systems in addition to database storage systems.

Knight Point Systems recently executed a project for Linden Labs, where members of the team evaluated six collocation facilities in the Northern Virginia area, developed a detailed Request for Proposals (RFP), evaluated responses negotiated price structures,

Description of Problem and Goals

Existing Linden hosted infrastructure was distributed across three (3) geographic areas, San Francisco, Phoenix, and Dallas, supporting a global population of three (3) million Second Life residents. There were over 6,800 currently deployed simulators supporting the existing Second Life population, and projected growth rates indicated that 24,700 simulators would be needed by year-end 2010.

In order to prepare for the anticipated growth, it was critical to re-design the hosted infrastructure to scale gracefully with Linden's success. Best practices dictate that the re-design be based on resident usage patterns, data flows between server assets,

and made a recommendation to the CIO of Linden Labs for selecting the best value solution for meeting the organization's requirements.

The final assessment provided a detailed summary based on RFP responses and site visit findings. The RFP responses along with the site visit inspections were evaluated and ranked based on a weighted grading scale. The weighted grading scale stressed the required elements while placing less emphasis on secondary features. Scoring of all the datacenter facilities/providers are presented as additional support for the final recommendation.

geographic distribution of end-users and the ability to scale within your datacenter footprint. Linden's core assets including the master database were housed in the 365 Main datacenter in San Francisco. The 365 Main Phoenix datacenter housed 24% of Linden assets (primarily simulators) and the DataBank datacenter in Dallas had 58% of Linden assets including simulators, data storage and database servers.

In addition to outgrowing the current space, many of the facilities have significant issues resulting in the urgent need for the organization to select a facility and migration the infrastructure into a collocation environment.

Description of Approach, Rationale, Results, and Timeline

Identify Collocation Facilities and Document Security Features

Knight Point utilized established relationships with several Data Centers and identified 6 facilities that meet the Uptime Institute's criteria for Tier III or above. These facilities included: Terremark, Equinix, CRG West, Digital Realty Trust, Switch & Data, and 365 Main. Using a comprehensive data center assessment profile form that included an extensive section on the security of the facility and environments, Knight Point collected data from each of the above facilities. Physical security topics that were addressed include:

Site Location and Propensity for Natural or Man-Made Disasters
Infrastructure Stability and Proximity to Vulnerable Areas
Building Purpose (Are there non-data center tenets in the building?)

- Perimeter Security

- Windows
- CCTV and Surveillance Including all Monitoring and Alerting
- Facility Access Points
- Computer Room Access Including Biometric Access
- Locked Cages and Cabinets
- Access History Retention for Audit Purposes
- Shared Space Requirements
- Trash and Shredding Requirements
- Cleaning Staff Requirements
- Visitor screening and mandatory escort policies
- Network Security and Penetration



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Provide Comprehensive Reviews of Prospective Collocation Facilities

Knight Point understood that Linden Labs required flexibility to meet changing capacity needs that were critical to the success of this hosting effort overall goals. With that in mind, Knight Point tailored the data center assessment profile to meet requirements and updated already existing data center assessment profiles. These profiles include over 100 data points in the areas of:

- General Facility Requirements
- Physical Security Requirements
- Space and Data Center Floor Requirements
- Power Delivery, Electrical, and Testing Requirements
- Cooling Requirements
- Fire and Smoke Detection Requirements
- Network Backbone and Connectivity Requirements

These data points are in line with system redundancy requirements as defined by the Uptime Institute.

This chart illustrates Tier similarities and differences

	TIER I	TIER II	TIER III	TIER IV
Number of delivery paths	Only 1	Only 1	1 active 1 passive	2 active
Redundant components	N	N+1	N+1	2 (N+1) or S+S
Support space to raised floor ratio	20%	30%	80-90%	100%
Initial watts/ft ²	20-30	40-50	40-60	50-80
Ultimate watts/ft ²	20-30	40-50	100-150	150+
Raised floor height	12"	18"	30-36"	30-36"
Floor loading pounds/ft ²	85	100	150	150+
Utility voltage	208, 480	208, 480	12-15kV	12-15kV
Months to implement	3	3 to 6	15 to 20	15 to 20
Year first deployed	1965	1970	1985	1995
Construction \$/ft ² raised floor*	\$450	\$600	\$900	\$1,100+
Annual IT downtime due to site	28.8 hrs	22.0 hrs	1.6 hrs	0.4 hrs
Site availability	99.671%	99.749%	99.982%	99.995%

*Excludes land and abnormal civil costs. Assumes minimum of 15,000 ft² of raised floor, architecturally plain one story building fitted out for the initial capacity, but with the backbone designed to reach the ultimate capacity with the installation of additional components. Make adjustments for NYC, Chicago, and other high cost areas.

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Exhibit 1. Uptime Institute Requirements. When evaluating receiving data centers, it is imperative to know and understand the business area requirements and select a data center that offers the redundancy and scalability to meet these requirements.

Document Technical and Operational Requirements.

When moving into a collocation facility's hosting environment, it is imperative to clearly understand and document technical and operation requirements and ensure that your concept of operations (CONOPS) is modified to reflect the changes that will be required while interacting with a new hosting vendor. Knight Point worked with the Linden Labs technical teams to understand and document all technical, facilities, and operational requirements and support Linden in the development of an RFP for collocation hosting space. Upon completing the detailed assessment of multiple collocation facilities for Linden Labs, Knight Point team members developed

the RFP that was sent to the qualified collocation facilities to solicit proposals for hosting the infrastructure that supports Second Life. In addition to facility requirements, the team also developed detailed uptime requirements, Service Level Agreements (SLAs), reporting requirements, and documented anticipated "touch points" to ensure that expectations were in line and that a new CONOPS was understood prior to migrating to the collocation environment. While facility and technical requirements are important, it is imperative to plan for the process changes that are inherent in this new operating environment.



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Understanding IT Service Management (ITSM) requirements and the responsibilities of each party of the keys to success when preparing for a migration to a new facility.

Selection of Collocation Facilities

When working with Linden Labs, Knight Point developed very specific evaluation criteria and a collocation facility “scorecard” that rated each facility against the criteria set forth in the requirements. During the process of evaluating qualified companies to support Linden Lab’s needs, Knight Point invited ten (10) hosting providers to submit proposals for review. From that group, four (4) providers were unable or unwilling to offer a qualified response. Knight Point

evaluated and scored the remaining six (6) responses based on a weighted scoring system that included a higher value for the “Required Features” and a lesser value to the “Secondary Features” or “nice to have” features. The team developed a scale with a possible 676 points available for a perfect score. The categories that were scored included: General Facility Information, cooling, power, services, and network and telecommunications.

Raised Floor Space – 72,000 sqft of usable floor space.	
Electrical Power – With a recent update, this facility provides 150W/sqft of power capacity. Total power plant – 30MW; Emergency power 21,600kW, Twelve 2.25MW backup generators, with fuel storage for minimum 48-hour run time.	
HVAC – The second floor space has multiple Computer Room Air Conditioning (CRAC) units within and adjacent to the Linden cage in an effort to overcome the physical limitations of the space. However, the impeded airflow within the space limits the effectiveness of the CRAC units. The low ceilings and concrete slab floor also negatively impacts the ventilation and airflow.	
Network Connectivity - Fiber cross connects are provided by the data center to Level 3 who provide Multi-homed 10gE access to Linden Labs.	
Physical Security – Data Center follows industry standard physical security practices with access to the datacenter floor via two-factor authentication using a badge and a biometric scanner.	

Exhibit 2. Sample Scorecard. Knight Point utilized a detailed scorecard to quantify strengths and weaknesses of potential data center solutions.

Recommend a Pricing Structure and Negotiation Strategy

Due to the inherent ability to negotiate pricing during a “Best & Final,” portion of the RFP process, it was important to select the best qualified provider and negotiate based on the comparative information provided from the pool of respondents. Because of this, Knight Point recommended excluding pricing from the scoring matrix, focusing instead on technical and operational factors to

qualify and rank the responses. The Team, while fully vendor neutral, had extensive experience negotiating pricing and worked with Linden to ensure that the best available pricing was attained for collocation services as well as for circuit and telecommunication costs.

Results

Following a quantitative technical evaluation and down selection process, four (4) finalists were selected site visits with each of the finalists were conducted by a team comprised of Knight Point and Linden Lab technical staff. This process resulted in two (2) capable hosting providers being identified; CRG West in Reston, Virginia and Terremark, in Culpeper, Virginia. Both facilities offered far superior technical infrastructure, cooling and power systems, and support staff than those currently provided at the San Francisco

facility. Each facility is designed with a highly redundant architecture and multi-layered security that includes bio-metric access controls, man-traps, and security personnel. Both CRG West and Terremark were aggressive in their pricing and Linden Lab would realize savings over 365 Main with either provider.

After further review and negotiations with the two finalists, Knight Point recommended



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Terremark as the Washington DC area datacenter provider for Linden Lab. Given a newer technical infrastructure, a more rural and secure location, a highly qualified technical staff, and the ability to leverage Terremark's cloud computing environment, we were confident that Linden Labs would benefit greatly by migrating to Terremark's NAP of the Capital Region, located in Culpeper, Va. Upon migration to Terremark, Linden Labs was immediately able to recognize the following benefits (compared to the San Francisco facility):

- A more scalable and redundant datacenter architecture to ensure availability of key infrastructure components;
- A more energy efficient power delivery method to the Linden Lab environment; Monthly savings of \$60k, annual savings of \$720k;
- A strategic partner who will enable Linden Lab to migrate to a cloud computing architecture, ultimately saving capital cost;
- A strategic partner interested in using their influence with the cloud computing market to introduce concepts and constructs that would benefit Linden Lab.