Ace Horizons

System Requirement

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1   Summary and Introduction

1.1   Summary

Ace Horizons is a multi-national start-up. It wishes to review its current systems and replace them with an appropriate cloud-based computing solution.

1.2   Introduction

This document is divided into three parts. The first part provides a narrative description of Ace Horizons systems which will be supported by the proposed IT system. There is a section that describes the raw performance of the key hardware. Finally, there is a section that records some of the essential statistics that may be of assistance in providing a quantified evaluation of the technical feasibility of the proposed design.

1.3   Scope

The architectural response to this requirement must set out:

- Database design for Ace Horizons' database

- Discussion of the hardware support for this database

- Discussion of the provisions for intra-site resilience

- Discussion of the provisions for resilience against catastrophes

- Fact-based analysis of the performance of the database against the overall performance requirement for the system.

- Discussion of effect of the resilience provisions on this on-line performance

In accordance with Ace Horizons policy, the proposed database solution must be based on the use of the Oracle RDBMS.

2   Background

2.1   Ace Horizons

Ace Horizons wishes to move its' Online Sales IT Systems to a Cloud-based system. Access to this system will be provided by PC/laptop based browsers. The proposed solution should not depend on the location of these browsers. Ace Horizons may choose to allow or to forbid the use of home-based access to the testing system.

2.1.1   Customer

The number of Customers on any one of the peak access days (sale period) is approximately 500,000. All these customers access the system over the same peak four-hour period. Each customer on average accesses 50 pages within the four-hour period.

When the Customers have concluded interacting with the system, they can login again and review their interaction with the system, including offers accepted.

2.2   Data Design

Each customer record contains:

- Customer number

- Region identifier

- Last Name

- First Name

- Other Names

Each customerCart record contains:

- Customer Cart identifier (primary key)

- Sale identifier (foreign key)

- Customer number (foreign key)

- Sale date

- Sale item number

- Offer identifier (foreign key)

- Array of Items Chosen

    o Product Identifier (foreign key)

    o Offer Price

Each sale record contains:

- Sale identifier (primary key)

- Description

- Sale date

Each Sale item record contains:

- Product identifier (primary key)

- Sale identifier (foreign key)

- Product description

Each SaleDetail record contains:

- Sale identifier (primary key)

- Customer identifier (foreign key)

- Product identifier (foreign key)

2.3   Resilience

The proposed system must be resilient to the loss of the primary data processing centre. In the event of a catastrophe, the proposed resilience provisions must enable the resumption of on-line access to the system as soon as possible and certainly after an interruption of no more than fifteen minutes.

2.4   Process design

The proposed design of the transaction system uses state-less session beans. The current state of the Sale is maintained in the Sale record. The information in that record provides the system with the current Sale item, the Offer identifier, and the identifiers of previously offers. This information is used to select the next offer and to ensure that the same sale item is not offered repeatedly.

3   Base Data

3.1   Statistics

On any particular Sale day approximately 500,000 customers receive offers.

Each customer must login, and access up to 50 offer and logout within the same four-hour period.

The system must service each offer and provide the next offer within one second at the central processing data centre. It is assumed that the performance of the communications links and the presentation hardware will consume a further one second of elapsed time so that the overall performance of the system as perceived by the customer will be an average response time of two seconds.

The subsequent presentation of results should have a similar level of performance.

3.2   Oracle RDBMS

The company has standardised on the use of the Oracle RDBMS. Character fields are generally stored as VARCHAR(255), though TEXT fields may be much larger. DATETIME fields require a 64-bit integer value. NUMERIC fields require a 64-bit integer value.

3.3   Hardware performance

3.3.1   SAN

A SAN delivers a 26msec performance for both reads and writes of individual blocks. This is independent of the block size because of the high speed of the bus, the extensive buffering within the SAN and the 4KB block size used by the underlying disc drives.

The underlying disc drives have a capacity of 16GB each and a disc-to-buffer transfer rate of about 100MB/sec. This transfer rate can be achieved through multi-block serial data transfers.

3.3.2   Communications links

The primary and secondary data centres will be connected by a dedicated 100Mbit/sec link.