After conducting interviews with stakeholders and performing technical assessments of the environment. The following info is about project’s goals, current environment, and business factors.

* Currently, there are 100 physical servers, each hosting a single application. Each application services 10 customers.
* The business expects to add 50 new customers over the next year.
* The solution must support growth over the next 5 years.
* Application uptime and accessibility is very important.
* Consolidate physical servers to reduce hardware costs associated with the maintenance and deployment of new application servers.
* No more than 20 application servers, or 200 customers, should be affected by a hardware failure.
* There should be a 1-hour maintenance window each month for application and hardware maintenance. Hardware maintenance is currently a challenge. Since hardware and application maintenance cannot be performed at the same time, the maintenance window does not typically provide the time that's required to perform both application and hardware maintenance. Application servers run Microsoft Windows 2016 as the operating system.
* Each application server is configured with 8 GB of memory. The peak usage of a single application server is approximately 65 percent or approximately 5.2 GB.
* Each application server is configured with two dual-core 2.7 GHz processors. The peak usage of a single application server is approximately 10 percent of the total processing power, or approximately 1 GHz.
* Each application server is configured with 100 GB of disk space. Peak disk capacity usage of a single application server is approximately 65 percent of the total disk space, or 65 GB. Peak disk performance of a single application server is 50 IOPS with an IO profile of 90 percent read and 10 percent write.
* Currently, the stakeholders are using HP DL380 servers. The infrastructure team is very familiar with the management and maintenance of these servers and wants to continue using them.
* Currently, there is no shared storage. The current system and infrastructure administrators are unfamiliar with the shared storage concepts and protocols.
* Cisco switches are used for network connectivity. Separate VLANs exist for management connectivity and production application connectivity.
* Currently, each physical server contains a single gigabit network interface card. Peak network usage is 10 Mbps.
* Server logs are auditable and must be retained for 6 months. All logs should also be sent to a central syslog server that is already in place.
* If an application server fails, the current recovery time is around 8 hours. The solution should reduce this time to less than 4 hours.
* The management team expects the implementation to be completed before the third quarter of the year. There is an approved project budget of $200,000.

Typical functional requirements include the following:

* Business goals
* Business rules
* Legal, regulatory, and compliance requirements
* Application system requirements
* Technical requirements
* Administrative functions

Typical nonfunctional requirements include the following:

* Performance
* Security
* Capacity
* Availability
* Manageability
* Recoverability

Design constraints include the following:

* Technology constraints, such as hardware vendors, software solutions, and protocols
* Operational constraints, such as performance and accessibility
* Financial constraints, such as budgets

The high-level steps to identify the constraints of a design are as follows:

* Analyze the business and technical information that's collected during the discovery process
* Determine the nonfunctional requirements of the design
* Nonfunctional requirements are constraints on the design
* Identify any other constraints on the design
* Document the design constraints

|  |  |
| --- | --- |
| **ID** | **Requirement** |
| R001 | Consolidate the existing 100 physical application servers down to five servers |
| R002 | Provide capacity to support growth for 25 additional application servers over the next 5 years |
| R003 | Server hardware maintenance should not affect application uptime |
| R004 | Provide N+2 redundancy to support a hardware failure during normal and maintenance operations |

Documenting the design constraints.

|  |  |
| --- | --- |
| **ID** | **Constraint** |
| C001 | HP DL380 servers should be used for compute resources |
| C002 | A project budget of $200000 |
| C003 | Syslog should be used to send server logs to an existing central syslog server |

As part of the design process, each assumption needs to be validated as a fact. **If an assumption cannot be validated, a risk will be introduced into the design.**

**Common assumptions relate to power, space, and cooling**. A common example of an assumption that an architect may make is as follows:

There is sufficient power, cooling, and floor/rack space available in the data center to support both the existing and consolidated environment during the migration

|  |  |
| --- | --- |
| **ID** | **Assumption** |
| A001 | Sufficient power, cooling, and floor/rack space is available in the data center to support the existing and consolidated environment during the migration |
| A002 | Resources should be provided to support a host failure during both normal and maintenance operations |
| A003 | Growth is calculated based on the addition of 50 new customers each year over the next 5 years |

Design risks include the following:

* Technical risks
* Operational risks
* Financial risks

Risks are often introduced through **constraints or assumptions that have not been proven.**

A good infrastructure design:

* Availability
* Manageability
* Performance
* Recoverability
* Security

**N+1 redundancy** - the N architecture to support a failure or allow a single machine to be serviced. When one system is offline, the extra component takes over its load. Going back to the previous example, if N equals four UPS units, N+1 provides five.

Brown, Mike; Cartwright, Hersey; Gavanda, Martin; Mauro, Andrea; Novak, Karel; Valsecchi, Paolo. The Complete VMware vSphere Guide: Design a virtualized data center with VMware vSphere 6.7 (pp. 144-145). Packt Publishing. Kindle Edition.