NIMBUS MIGRATION TO AZURE CLOUD PLATFORM

EXECUTIVE SUMMARY

Nimbus has experienced a catastrophic event that destroyed its on-premises data center. In the wake of this disaster, several senior staff members have departed the organization, investor relations have become rather strained, and growth plans have been put on indefinite hold.

This proposal outlines a comprehensive strategy for restoring and fortifying Nimbus's IT infrastructure, mitigating future risks of this kind, and positioning Nimbus for sustainable success without the burden of excessive capital expenditure.

1. PROBLEM STATEMENT

1.1 Organizational Background

Nimbus is a startup IoT manufacturing company headquartered in Green Bay, Wisconsin, selling B2B and B2C. Two months ago, a water pipe broke and destroyed most of our data center. With no backup facility or equipment, we have coddled together a makeshift system, but it's severely underperforming. Most of the senior staff have resigned. This setback has put our startup's growth plans on permanent hold, severely angering our investors. We have been tasked with restoring our original capacity, making it fully fault tolerant and able to support our expected revenue growth of 10% (month over month) for the next 3 years.

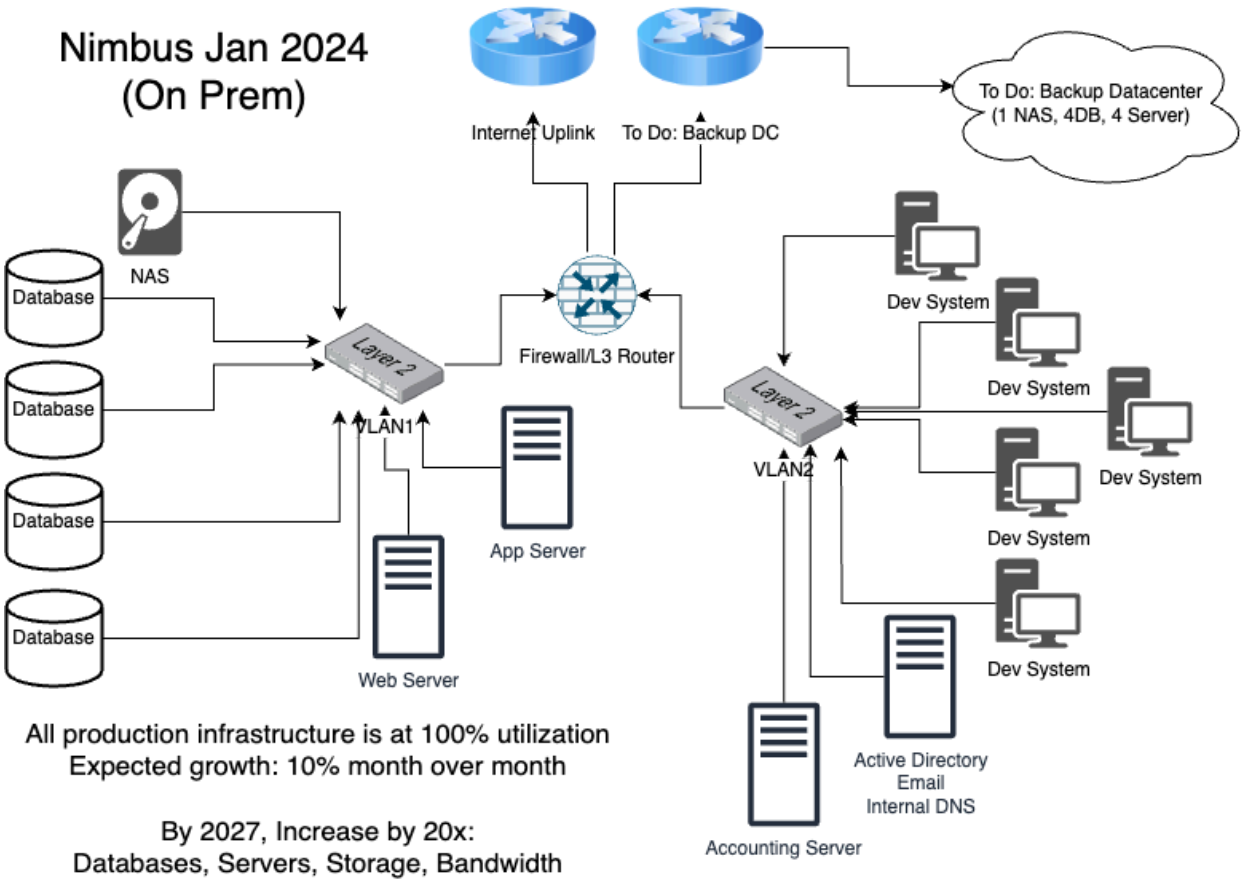
1.2 Business Case

Our current needs are as following: 4 database servers (quad core, 64GB RAM), 1 web server (quad core, 32GB RAM), 1 app server (16 core, 128GB RAM), 1 accounting server (dual core, 32GB RAM), 1 email / active directory server (dual core, 16GB RAM), a firewall and 16 port switch. Our software engineers need 5 systems for development. We require at least 20TB of

NAS storage and 5TB monthly bandwidth. Given our growth rate, we expect the database, web, app servers, storage and bandwidth to expand 20x within 3 years. Engineering has established that our software will work on virtual machines and can easily be containerized, however, the servers are all at 100% utilization around the clock. We also evaluated that at least 50% of the data could be held in blob storage.

1.3 Architectural design of Nimbus' Physical Infrastructure

Nimbus' current architecture is under immense strain. Due to the limited cash and credit reserves, we cannot afford to buy more advanced infrastructure at this time. Of particular note is that we only have the ability to use 2 VLANs. This means that one VLAN is in the demilitarized zone, and all other corporate infrastructure is on the other. Developer systems are therefore on the same network as production backend servers like our Accounting and Active Directory servers. We planned to have a redundant data center, but were unable to build that before the flood.



2. PROPOSED SOLUTION

We have evaluated two possible solutions: rebuilding the on-prem data center with a redundant center in our Syracuse branch, or utilizing a cloud provider. We calculated the cost for immediate rebuild, and the upfront cost for our expected 5 year growth rate.

2.1 Value Proposition and Value Creation

I. Recovery Speed: Should Nimbus opt to rebuild an on-premises physical infrastructure, we estimate a recovery time of 4-6 months before business operations can fully resume. This prolonged downtime will result in significant revenue loss and erosion of customer

confidence. Additionally, the team can only commence setting up the redundant data center (DR site) post-completion of the set-up of the primary data center which is projected to take an additional 3 months. Any failure or downtime at the primary site during this period would have a severe impact on business continuity.

Setting up our infrastructure on Azure would enable us to establish both the primary and DR sites concurrently within 4 weeks. The flexibility and convenience provided by the Cloud guarantees a significantly faster recovery time, that will help to minimize possible losses that will be incurred during this period.

II. Cost Management: A key concern is the associated costs of migrating to the cloud. However, Nimbus will be able to use its existing Windows Server licenses and SQL Server licenses in Azure without incurring additional virtual machines licensing costs. This license mobility benefit will help to substantially reduce projected expenditures, and is one of the key benefits of using Azure over other cloud providers.

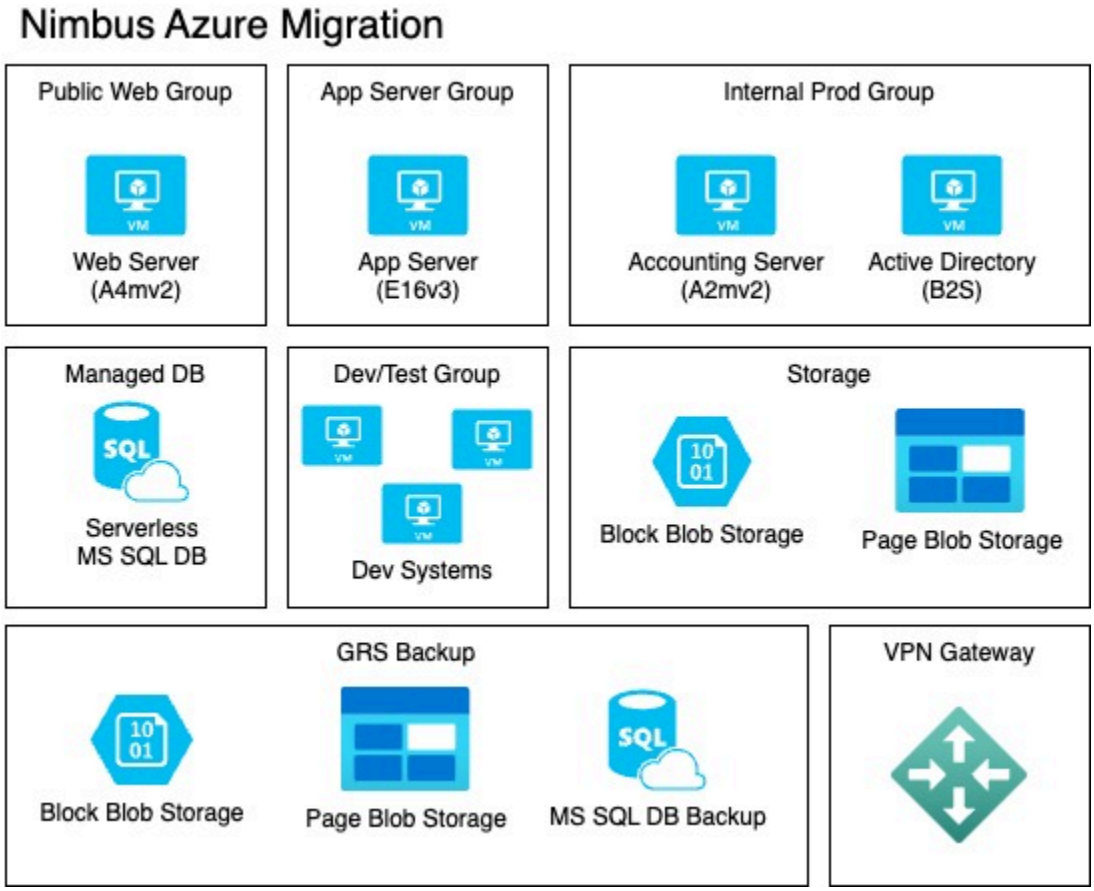
III. Scalability: According to financial projections, Nimbus' customer base is projected to grow significantly over the next several years. We project that 3 years from now, we need 20x as much compute, storage and networking. Migrating to Azure ensures that our IT infrastructure can seamlessly scale to accommodate changing business needs, eliminating potential bottlenecks or capacity limitations.

IV. Reduced costs: The costs associated with rebuilding the data center are substantial when compared with establishing the same infrastructure on the Cloud [reference financial analysis in section 2.3 below]. Moreover, by leveraging Azure's three year savings plan and resource optimization tools, the Nimbus IT Operations team can continuously optimize workloads, reducing operational costs and maximizing resource utilization.

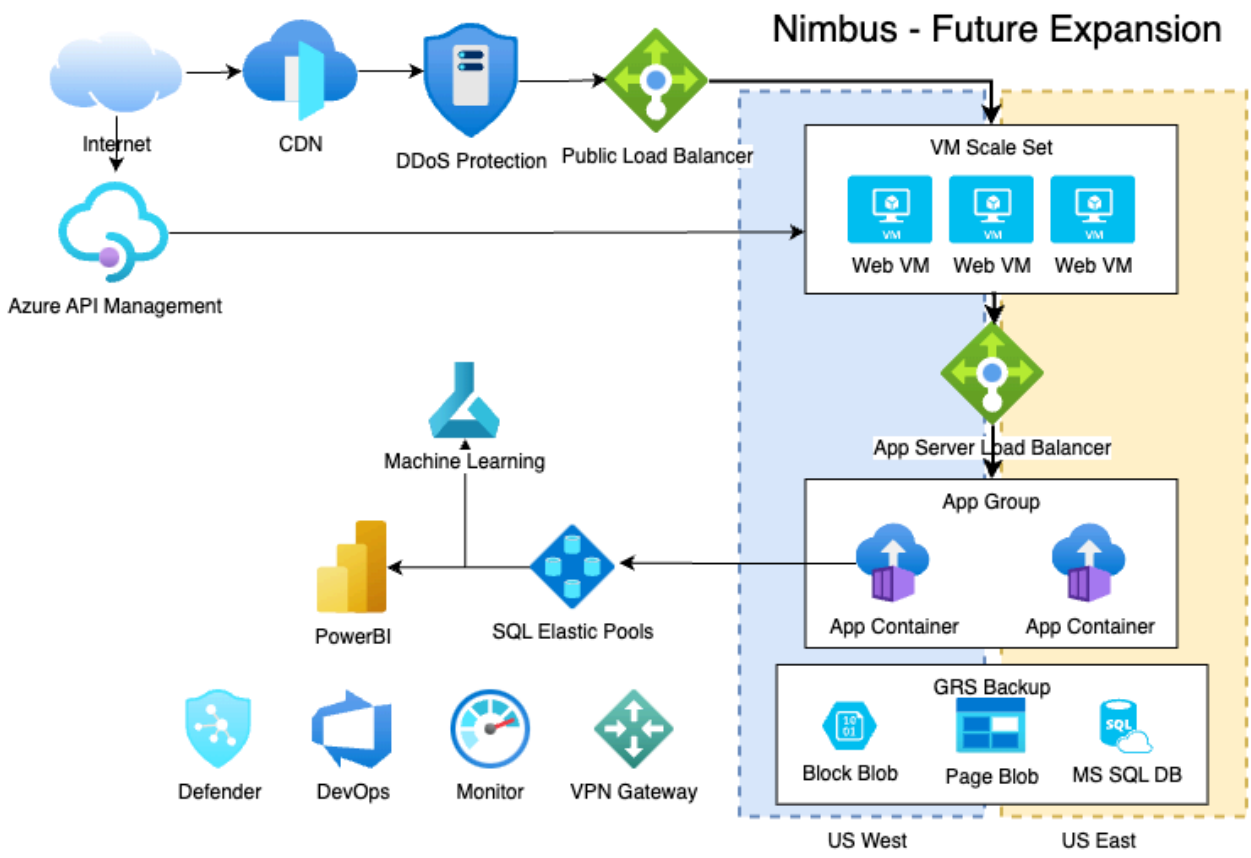
V. Disaster Recovery and Business Continuity: While the probability of experiencing a similar disaster is low, it is crucial to implement robust measures to mitigate the impact of such events in the future. An on-premises physical infrastructure inherently poses greater security and reliability risks. Azure offers the opportunity to significantly reduce these risks through its enterprise-grade security, compliance, and availability guarantees. Additionally, Azure's best-in-class backup, recovery, and failover services ensure that Nimbus can recover from service disruptions promptly, minimizing downtime and data loss.

VI. The proposed solution prioritizes critical factors such as DDoS protection, service monitoring, load balancing, improved security, reliability, high availability, and fault tolerance - all of which were missing from the previous architecture.

2.2 Architectural Design of Nimbus' Cloud Architecture



The initial architecture is designed to mostly lift and migrate to the cloud. All of our existing servers are converted over to standalone virtual machines of varying sizes, with the exception of the database. Instead of running multiple database VM, or one large database VM, we will take advantage of the serverless MS SQL option. Since the development systems are not 100% utilized, they will be started and stopped as needed, reducing the cost. Storage will be evenly divided between the cheaper block blobs, and the more read-write performant page blobs. All of our data will be backed up to a geographically different region. Finally, we will set up a VPN gateway to provide easier access to Azure resources from within the network.



While the initially proposed design will get us up and running again, we are focused on our expected growth. We have planned out how to scale our infrastructure as we obtain more clients by enacting a four tier web service. Azure offers a free load balancing solution, which we will place at the entry point. This will feed into a VM Scale Set. The scale set allows us to dynamically grow and shrink the number of web servers in use, depending upon demand. Behind them, we will set up another load balancer that goes to a collection of app servers. We plan to start converting to containers with this component. Instead of using a serverless SQL database, we can switch over to SQL Elastic Pools. In our growth phase, we plan to create a large number of databases. The elastic pool will enable us to efficiently scale our offering while controlling costs. All of these distributed systems can run in

multiple availability zones and multiple regions, ensuring operational resiliency.

We want to also take advantage of some more advanced features in Azure as aspirational goals. We can integrate their machine learning products to help us develop a supervised ML model. PowerBI will provide us with additional insights and dashboards. As we get larger, we become a greater target on the internet, so anti-DDoS protection will become a requirement. Monitoring and Defender products will help keep our systems secure and alert us to potential problems. Our development team can use DevOps for change control, change management and CI/CD. Finally, as we enter partnerships with other vendors and providers, we can take advantage of Azure API Management to help us set up, control and manage our data integrations.

2.3 Financial Analysis

As a startup company, Nimbus must carefully manage its limited financial resources. Earmarking a significant portion of capital for upfront expenditures on an on-premises infrastructure will have a substantial impact on our financial position. Given the revenue loss and business disruption caused by the recent disaster, incurring a substantial upfront cost is inadvisable at this juncture.

Refer to Tables 2.1 and 2.3, with the on-premises option, Nimbus would have to commit up to $35,000 upfront for hardware costs. Additional costs would also include costs for rent, cooling, heat suppression systems, electricity, and data center maintenance. Overall, the on-premise option is set to cost at least 11% more than the cloud solution in the first year alone.

Additionally, Nimbus anticipates a substantial increase in its customer base over the next 5 years that is projected to result in a 20x increase in service utilization of services. As detailed in Tables 2.2 and 2.4, the estimated cost

of scaling a non-premise data center to accommodate this growth is 62% higher than the cloud solution.

The pay-as-you-go pricing structure of the cloud solution and its operational expenditure model presents a more financially viable option both short-term and long-term. This approach aligns with Nimbus's need for cost-effective scalability and resource optimization, positioning Nimbus for sustainable growth without the burden of excessive capital expenditure.

Table 2.1: Upfront projected spend for on-premises infrastructure

Hardware	**Cost**
1 proc 4 core, 7 GB RAM physical server for Windows	$1951
2 proc 8 core, 64 GB RAM physical server for Windows	$14105
1 proc 2 core, 3.5 GB RAM physical server for Windows	$1684
1 proc 2 core, 3.5 GB RAM physical server for Windows	$1684
1 proc 4 core, 7 GB RAM physical server for Windows (4 servers)	$7804
Total cost for physical servers	$27228
Cost of maintaining physical servers (estimated 20% of server cost)	$5445
Total hardware cost for 1 year	**$32673**
Software	Cost
Windows datacenter license per 1 proc, 4 core, 7 GB RAM physical machine	$6155
Windows datacenter license per 2 proc, 8 core, 64 GB RAM physical machine	$6155

Windows datacenter license per 1 proc, 2 core, 3.5 GB RAM physical machine	$6155
Windows datacenter license per 1 proc, 4 core, 7 GB RAM physical machine (4 licenses)	$24,620
Total software license cost	**$49240**
Total software assurance cost	**$12310**
Total software cost for 1 year	**- Existing license can be transferred**
Electricity (Price of electricity per kWh $0.1334)	Cost
Power rating of 4 core, 7 GB RAM server - estimated 166 Watts	$16.17
Power rating of 8 core, 64 GB RAM server - estimated 682.3 Watts	$66.44
Power rating of 2 core, 3.5 GB RAM server - estimated 156 Watts	$15.19
Power rating of 2 core, 3.5 GB RAM server - estimated 156 Watts	$15.19
Power rating of 4 core, 7 GB RAM server - estimated 166 Watts	$64.68
Total electricity cost for 1 year	**$2152**
Database	Cost
SQL Server Enterprise License cost per 2 cores (16 cores total)	$114048
Enterprise Software Assurance cost per 2 cores (16 cores total)	$141840
Total SQL database cost for 1 year	**- Existing license cost can be used**
Data center	Cost

Rack Units	$11
Data center construction cost per rack unit amortized over 20 years	$302.27
Data center compute cost	$3324.97
Rack mounting/installation for NAS	$3022.70
Total data center cost for 1 year	**$6660.94**
Networking	Cost
Network hardware and software cost assumed to be 15% of yearly hardware and software cost	$6747.45
Network maintenance cost assumed to be 15% of yearly network hardware and software	$1013
Service provider cost/GB per month - $0.15 Amount of bandwidth needed (GB) per month - 5,120	$9216
Total networking cost for 1 year	**$16976.45**
Storage	Cost
Local Disk/SAN-HDD Cost per GB - $0.20 Storage (RAID 10 configuration) volume in GB - 5,120 Blob Cost per GB - $0.20 Storage (RAID 10 configuration) volume in GB - 5120	$2048
Backup and Archive cost for 1 year	$64
Storage maintenance cost (10% of storage procurement cost)	$205
Total storage cost for 1 year	**$2317**
IT Labor	Cost
Number of IT admin hours needed per year -	$23

estimated 2440 Hourly rate for IT admin	
Total IT labor cost for 1 year	**$56,120**
Total On-Premises cost for 1 year	**$116890**

Table 2.2: Project 5-year spend for on-premises infrastructure (20x service utilization increase)

Category	**Cost**
Hardware	$961,136.00
Software	$938,136.00
Electricity	$178,570.00
Database Licenses	$5,117,760.00
Data Center	$933,731.70
Networking	$1,064,990.92
Storage and Backup	$133,760.00
IT Labor	$280,600.00
Total	**$9,608,684.62**

Table 2.3: Projected spend for Azure Infrastructure (current service utilization rate)

Service type	**Description**	**Estimated monthly cost**
Azure SQL Database	Elastic Pool, vCore, Business Critical, Provisioned, Standard-series (Gen 5), 2 - 8 vCore instance(s), 3 year reserved, 100 GB Storage, AHB for SQL Server, RA-GRS Backup Storage Redundancy, 0 GB Point-In-Time Restore, 0 x 5 GB Long Term	$1,825.70

	Retention	
Virtual Machines	1 E8-4as v4 (4 vCPUs, 64 GB RAM) (3 year savings plan), Windows (AHB), OS Only; 3 managed disks – S4, LRS - 16 GB; Inter Region transfer type, 5 GB outbound data transfer from West US to East Asia	$198.97
Virtual Machines	1 B16als v2 (16 vCPUs, 32 GB RAM) (3 year savings plan), Windows (AHB), OS Only; 0 managed disks – S4; Inter Region transfer type, 5 GB outbound data transfer from West US to East Asia	$239.91
Virtual Machines	1 E4-2as v4 (2 vCPUs, 32 GB RAM) (3 year savings plan), Windows (AHB), OS Only; 0 managed disks – S4; Inter Region transfer type, 5 GB outbound data transfer from West US to East Asia	$96.74
Azure Active Directory External Identities	Premium P1 tier: 50,000 monthly active user(s), 0 SMS/Phone Events	$0.00
Azure Firewall	Standard tier, 1 Logical firewall units x 730 Hours, 0 GB Data processed	$912.50
Azure Firewall Manager	1 Parent Policies. "Policy 1" (Policy 1): 1 Firewall(s), 1 Region(s)	$0.00
Azure Files	SSD (Premium) Tier, LRS Redundancy, 1,000 GiB Provisioned storage with 4,000 IOPS and 200 MiB/sec throughput, Pay As You Go, 1,000 GiB, 0 Additional Sync Server(s)	$326.00
Storage Accounts	Block Blob Storage, General Purpose V2, Hierarchical Namespace, LRS Redundancy, Hot Access Tier, 1,000 GB Capacity - Pay as you go, 10 x 10,000 Write operations, 10 x 10,000 Read operations, 10 x 10,000 Iterative Read operations, 10 x 100 Iterative Write operations, 1,000 GB Data Retrieval, 1,000 GB Data Write, SFTP	$52.56

	disabled, 1,000 GB Index, 1 x 10,000 Other operations	
Virtual Network	West US (Virtual Network 1): 100 GB Outbound Data Transfer; East US (Virtual Network 2): 100 GB Outbound Data Transfer	$14.00
Load Balancer	Standard Tier: 5 Rules, 1,000 GB Data Processed	$23.25
Azure Front Door	Azure Front Door (Classic) - Outbound Data Transfer [North America, Europe, Middle East and Africa - 5GB], 5 GB Inbound Data Transfer, 0 Routing rules x 730 Hours, 0 Additional rules x 730 Hours, 0 Additional Custom Domains, 1 Policies, 0 Custom Rules, 0 x 1 million Custom requests processed, 0 Default rulesets, 0 Managed ruleset requests processed	$5.90
Traffic Manager	1 million DNS queries/mo, 0 Azure endpoint(s), 0 Fast Azure endpoint(s), 0 External endpoint(s), 0 Fast External endpoint(s), 0 million(s) of user measurements, 0 million(s) of data points processed.	$0.54
Azure DNS	Zone 1, DNS, Public; 1 hosted DNS zone, 1 DNS query	$0.90
Azure Backup	Azure VMs, Standard Backup policy, 1 Instance(s) x 1,000 GB, LRS Redundancy, Low Average Daily Churn, 1,646 GB Average monthly backup data in Standard Tier, 42 GB Average monthly backup data in Archive Tier	$63.39
Notification Hubs	Basic tier, 1 million additional pushes	$10.00

Azure Monitor	Log analytics: Log Data Ingestion: 4 GB Daily Analytics logs ingested, 1 GB Daily Basic logs ingested, 1 months of Interactive Data Retention, 0 months of data archived, 0 Basic Log Search Queries per day with 0 GB data scanned per query, 0 GB of Log Data Exported per day, Platform Log Data Processed per day: 0 GB with Destination to Storage or Event Hub and 0 GB with Destination to Marketplace Partners, 0 Search job Queries per day with 0 GB data scanned per query; 0 SCOM MI Endpoints; Managed Prometheus: 0 AKS nodes in cluster, 10000 Prometheus metrics per node, 30 seconds of Metric collection interval, 0 Average daily Dashboards users, 7 Dashboards, 50000 Data samples queried per dashboard, 25 promql alerting rules, 25 promql recording rules; Application Insights: 3 months Data retention, 0 Multi-step Web Tests; 20 resources monitored X 1 metric time-series monitored per resource, 20 Log Alerts at 5 Minutes Frequency, 0 Additional events (in thousands), 25 Additional emails (in 100 thousands), 25 Additional push notifications (in 100 thousands), 23 Additional web hooks (in millions)	$673.60
Microsoft Sentinel	Logs ingested - 10 GB Basic logs per day, 1 GB Analytics logs per day; Azure Monitor Retention - 3 months of Data Retention, 1 months of Data Archive; Azure Monitor Data Restore - 500 Basic log queries per day, 1000 GB data scanned per query, 2000 GB Data Restored, 0 days data restored; Azure Monitor Search Queries and Search Jobs – 0 queries per month, 0 GB data scanned per query of Basic Log Queries, 0 queries per	$521.40

	month, 0 GB data scanned per query of Search Jobs	
Azure DDoS Protection	Network Protection, Protection for 100 resources	$2,943.55
Power BI Embedded	1 node(s) x 730 Hours, Node type: A1, 1 Virtual Core(s), 3GB RAM, 1-300 Peak renders/hour	$735.91
		$100.00
	Microsoft Customer Agreement (MCA)	
		$8,744.82 monthly $104,937.84 for 1 year

Table 2.4: Project 5-year spend for Azure Infrastructure (20x service utilization increase)

Category	**Cost**
Compute (Inclusive hardware, software, electricity and database)	$1,660,207.20
Data Center	$0.00
Networking	$92,160.00
Storage and Backup	$1,749,597.00
IT Labor	$80,500.00
Total	**$3,582,464.20**

2.4 Business Continuity

Another consideration in our move to Azure revolves around business continuity and disaster recovery. We have seen first hand how disruptive it can be to have all our systems and data in one location. The on-prem option listed above does not include any physical redundancy. We would need to build a second data center to operate as a hot standby. The downside to this

approach is that we would need to double the cost of the on-prem option, exclusive of software licensing. Nearly everything would need to be purchased twice, including paying double the rent. Electricity and cooling may be a bit less than double, as these systems will not be running at full capacity until needed, but we'd still need to run some systems for performing data and config replication. We'd also need to hire or contract I.T. personnel in the second location to install and maintain the backups.

By contrast, we have redundancy built into our Azure system from day 1, with further options in our expanded model. The data is all stored with geographic redundancy, ensuring a widespread natural disaster will not result in data loss. The worst case scenario is that the hardware for our virtual machines is destroyed. In that instance, we still have the data, and can immediately provision another set of machines in a different location.
Our expanded model allows for more flexibility. By using a combination of load balancers, VM Scale Sets and containerized app server, we can provision systems in multiple data centers simultaneously. This has the added benefit of being able to redirect user traffic to systems that are geographically closer, reducing latency and further mitigating against disaster. These costs are already included in the Azure financial analysis.

2.5 Request for Funding

The proposed migration of Nimbus's IT infrastructure to Azure cloud platform presents a strategic solution that addresses our immediate recovery needs while positioning the company for long-term success.
In our proposal to migrate Nimbus's IT infrastructure to the Azure Cloud platform, we have conducted a detailed financial analysis comparing the long-term costs associated with maintaining and expanding our on-premises data center against adopting a cloud-based solution.

Over a projected five-year period, expanding the on-premises infrastructure to accommodate a 20x increase in service utilization is estimated to cost $9,608,684.62.

In contrast, the same level of service expansion using Azure Cloud is projected to cost $3,582,464.20.

This cost comparison results in a **calculated savings of approximately 62.72%** ((1 - (Cost of Azure solution / Cost of on-premises solution)) × 100%) when choosing Azure over maintaining and expanding an on-premises data center. This significant reduction in cost is critical for Nimbus, especially considering our current financial constraints and growth objectives.

To this end, we **request your consideration and approval of a budget of $104,937.84 for the first year, and a projected five-year investment of $3,582,464.20** to establish and scale our cloud infrastructure on Azure. Azure's enterprise-grade security, compliance, and availability guarantees, coupled with its best-in-class backup, recovery, and failover services, will help ensure that Nimbus can mitigate the risks associated with potential downtime, data loss, and capacity constraints, enabling us to maintain business continuity.

Time is of the essence, and a prompt decision to migrate to Azure will enable us to restore our operational capacity within four weeks, minimizing potential losses and erosion of customer confidence.