CONFIDENTIAL

DATABASE AS A SERVICE
SERVICE DEFINITION DOCUMENT

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business technology. managed.

A STATEMENT FROM OUR CEO

Supporting you and your organisation's IT business outcomes is the sole aim of Redcentric's G-Cloud Service.

All of the team at Redcentric have worked hard to develop a service that is designed to meet the most exacting requirements while helping you achieve business objectives, such as releasing staff to concentrate on core business operations, driving down your operating costs and delivering more for less. Since the inception of G-Cloud, the team at Redcentric have worked with our public sector clients to tailor our services, ensuring we can support you in achieving these objectives.

From the first iteration of G-Cloud we have invested heavily in staff and resources, to reduce the time it takes us to deliver services to you, make your procurement process as painless as possible, and ensure the engagement doesn't impact heavily on you or your team.

The clients we currently work with trust us to deliver consistently high-quality services, because that's what we have delivered for them over the long-term. Our culture is one of long-term partnership to navigate through the challenges of the ever-changing technology landscape – the journey from old to new.

I hope while reading through this document we are able to answer all your questions, however if any clarification is needed please do not hesitate to contact a member of the Redcentric team and we will do what we can to answer your queries.

Kindest regards

Fraser Fisher

INTRODUCTION

G-CLOUD GUIDANCE

WHAT IS G-CLOUD?

The G-Cloud Framework Agreement allows all public sector organisations to purchase Cloud services from a wide range of approved suppliers, including many small and medium-sized enterprises (SMEs). The Framework Agreement complies with the Official Journal of the European Union (OJEU), removing the need for OJEUs to be issued and thereby accelerating and simplifying the procurement process.

WHAT IS THE DIGITAL MARKETPLACE?

The Digital Marketplace is an online catalogue of ICT services available for purchase, developed within the G-Cloud strategy.

It lists the services, their main features and pricing; it also offers advanced search criteria designed to narrow down the most relevant options; and it sets out supplier terms and conditions.

WHEN SHOULD G-CLOUD AND THE DIGITAL MARKETPLACE BE USED?

If a buyer has a project whose requirements can be fully met by commoditised Cloud services, then the Digital Marketplace should be seen as the default procurement mechanism. It helps avoid tie-ins to long contracts and those custom-built solutions which can take a long time to develop and are expensive to manage, change and upgrade.

The rapid deployment nature of Cloud services should appeal to those who need solutions up and running quickly and the essential up-scaling/down-scaling and off/on capability within Cloud will appeal to those needing a trial or proof of concept, or where a project may flex or shrink over a period of time. That Cloud principle is there again – you only pay for what you need, making it a cost-effective option for even the most agile organisation.

WHAT ARE THE ADVANTAGES OF USING G-CLOUD AND THE DIGITAL MARKETPLACE?

Buying through G-Cloud and the Digital Marketplace has many advantages, the most obvious being that it is quicker and easier to choose a service provider, removing as it does the laborious process of issuing OJEUs while still ensuring compliance with procurement regulations.

The readily available list of approved suppliers, the commoditised nature of the services and the transparent pricing also combine to strip cost out of the process as well as make the deliverables cheaper; and by opening Digital Marketplace up to many more companies, especially SMEs, there is a consequential uplift in choice, innovation and competitiveness. By harnessing the fundamental pay as you use principle of Cloud computing, buyers are guaranteed to only pay for what they actually need, eliminating the waste associated with over provisioning.

WHAT ELSE DO I NEED TO KNOW?

It is important to appreciate that what characterises services in the Digital Marketplace is that they have been designed – and priced – as a standard commodity. Under procurement regulations, G-Cloud suppliers cannot modify their Digital Marketplace services to meet specific requirements; bespoke rework has cost implications and risks undermining the good value inherent within commoditised ICT. For Digital Marketplace to work, you need to be sure from the outset that the functionality you need is indeed available 'out of the box'.

G-CLOUD SERVICE OVERVIEW

Redcentric's Database as a Service (DBaaS) provides a platform for consolidating customer servers, storage and database workloads to achieve compelling advantages in cost, quality of service and agility. DBaaS utilises Oracle databases delivered from private infrastructure hosted and managed by Redcentric that can be extended to host customer applications.

Redcentric's DBaaS allows customers to migrate from traditional physical infrastructure into the cloud without requiring complete re-architecture or rebuild of applications. It is suited to customers consolidating multiple aging servers onto new platforms to provide increased performance, agility and reliability. The service can provide:

Professional services for:

- Design covering: Network and data centre design and test
- Migration covering: Environment discovery, project management, service design, build, test, migration, cutover and acceptance testing
- DBaaS service design covering: live service/support design, processes, documentation and transition into support
- Supply of DBaaS platforms or use of customer procured equipment
- Platform hosting within Redcentric data centres

DBAAS – SERVICE DEFINITION

DBaaS is split into a number of activities covering:

- Service Activation made up of:
  - » Project management
  - » Discovery and design tasks to select the platforms required to support DBaaS
  - » Data centre, network and data infrastructure design and build
  - » Platform procurement and commissioning
  - » First cut migration of customer data from existing to the DBaaS platform
  - » Functional / non-functional testing and assurance
  - » Design optimisation, such as improving database configuration, to utilise the new infrastructure
  - » Live service / support design, process documentation
  - » Departmental security accreditation
  - » Backup and disaster recovery design, implementation and testing
  - » Additional customer data migrations
  - » Go live operational support
  - » Live service transition into support
- Live Service Support covering:
  - » Day to day operational support of the DBaaS platforms
  - » Planned upgrades
  - » Contract change activities

The remainder of this document steps through these topics in more detail.

DBAAS PLATFORMS & INFRASTRUCTURE LOCATION

DBaaS is delivered from customer dedicated hardware platforms (also known as private clouds), hosted and managed from Redcentric's UK data centres, with all associated data stored in the UK only.

Redcentric can provide the hardware platforms based on Oracle Engineered Systems or commodity hardware as part of the service activation, with the following options:

- Oracle Exadata Database Machine
- Oracle SuperCluster
- Oracle Database Appliance
- Commodity X86 hardware

Alternatively Redcentric can utilise customer provided Oracle Engineered Systems or commodity X86 hardware.

DBAAS PLATFORM SPECIFICATION

Redcentric and Oracle work with the customer to select the appropriate platform required to deliver DBaaS. Whilst already highlighted previously, DBaaS can be delivered from Redcentric or customer provider equipment. The following sub-sections provide detail on the high level specifications available for each product option.

ORACLE EXADATA DATABASE MACHINE

The Oracle Exadata (X5-2) Database Machine is an Oracle Engineered System designed to deliver higher database performance, availability and cost effectiveness compared to traditional deployments. Exadata is suited to running all types of database workloads including online transaction processing, data warehousing, in-memory analytics and consolidation of mixed database workloads.

G-CLOUD SERVICE OVERVIEW

Exadata is a converged system built by Oracle that contains all of the hardware needed to run Oracle databases. This translates to an Oracle rack delivered with inclusive 40Gbps InfiniBand networking and a number of database servers and storage servers dependent upon whether a quarter, half or full rack configuration is selected. The following table lists the high level specifications of Exadata in the different base configurations.

Element	Quarter Rack	Half Rack	Full Rack
Database Servers	2	4	8
Database CPU sockets (Intel Xeon E5-2699 v3)	4	8	16
Database CPU cores	72	144	288
Database Memory (minimum)	512 GB	1,024 GB	2,048 GB
Database Memory (maximum)	1,536 GB	3,072 GB	6,144 GB
Storage Servers	3	7	14
Storage CPU cores for SQL processing	48	112	224
Storage – High Capacity (HC) configuration	19.2 TB (raw) flash 144 TB (raw) disk 63 TB usable	44.8 TB (raw) flash 336 TB (raw) disk 150 TB usable	89.6 TB (raw) flash 672 TB (raw) disk 300 TB usable
Storage – HC performance	SQL flash (max) 30GB/s bandwidth 1M IOPS read 0.5M IOPS write SQL Disk (max) 5GB/s bandwidth 7K IOPS	SQL flash (max) 70GB/s bandwidth 2M IOPS read 1.3M IOPS write SQL Disk (max) 10GB/s bandwidth 16K IOPS	SQL flash (max) 140GB/s bandwidth 4.1M IOPS read 2.6M IOPS write SQL Disk (max) 20GB/s bandwidth 33K IOPS
Storage – HC maximum data load rate	5.0 TB/hour	10.5 TB/hour	21.5 TB/hour
Storage – Extreme Flash (EF) configuration	38.4 TB (raw) flash 17 TB usable	89.6 TB (raw) flash 40 TB usable	179.2 TB (raw) flash 80 TB usable
Storage – EF performance	SQL flash (max) 56GB/s bandwidth 1M IOPS read 1M IOPS write	SQL flash (max) 131GB/s bandwidth 2M IOPS read 2M IOPS write	SQL flash (max) 263GB/s bandwidth 4.1M IOPS read 4.1M IOPS write
Storage – EF maximum data load rate	5.3 TB/hour	10.5 TB/hour	21.5 TB/hour
Oracle database versions supported	Oracle Database 12c and 11g		

Oracle database software is licensed on the number of cores enabled. Exadata capacity-on-demand software licensing allows up to 60% of the cores per server to be turned off during the hardware installation, leaving at least 14 cores enabled. Capacity-on-demand can be used to re-enable cores and licences (2 cores at a time) as the workload grows.

Each database server is provided as a minimum with 256GB memory and this can be expanded up to 768GB.

Storage servers can be deployed in either high capacity or extreme flash configurations. The high capacity configuration uses 12 x 4TB 7,200 rpm disks combined with 4 x 1.6TB (raw) PCI flash cards. The high capacity PCI flash cards are usually configured as a disk cache, providing a significant performance over disks alone. The usable capacities quoted in the table are based on use of Oracle Automatic Storage Management (ASM) normal redundancy mode, which provides a single mirror of the data, i.e. 1 primary extent and 1 mirrored extent.

Exadata supports elastic configurations by growing the base configuration (2 database servers and 3 storage servers) by adding more database or storage servers as requirements grow.

The Exadata Storage Expansion Rack is available as an option to grow the storage capacity and bandwidth of an Exadata. This can be used to support databases requiring large volumes of data along with database backups.

ORACLE SUPERCLUSTER

The Oracle SuperCluster is an Oracle Engineered System designed to deliver higher database and application performance, availability and cost effectiveness compared to traditional deployments. SuperCluster is suited to running Oracle database, Oracle applications along with applications certified to operate on Oracle Solaris 8, 9, 10 and 11. SuperCluster is suited to running online transaction processing, data warehousing, in-memory analytics and consolidation of mixed database and application workloads.

SuperCluster is a converged system built by Oracle that builds on the Oracle Engineered System premise of Exadata, with the addition of Oracle SPARC processors and mainframe reliability, availability and serviceability features making it suitable for mission critical applications. The following tables lists the high level specifications of SuperCluster in the different configurations.

Element	SuperCluster T5-8 Half Rack	SuperCluster T5-8 Full Rack	SuperCluster M6-32 Minimum Configuration	SuperCluster M6-32 Maximum Configuration
Database and application compute servers	2	2	N/A	N/A
Oracle SPARC processor	SPARC T5 16-core 3.6GHz	SPARC T5 16-core 3.6GHz	SPARC M6 12-core 3.6GHz	SPARC M6 12-core 3.6GHz
Database and application compute cores	128	256	192	384
Database and application compute memory	2 TB	4 TB	8 TB	32 TB
Storage Servers	4 x Exadata X5-2	8 x Exadata X5-2	9 x Exadata X5-2	
Storage CPU cores for SQL processing	64	128	144	
Storage – HC configuration	25.6 TB (raw) flash 192 TB (raw) disk 85 TB usable	51.2 TB (raw) flash 384 TB (raw) disk 171 TB usable	57.6 TB (raw) flash 432 TB (raw) disk 192 TB usable	
Storage – HC performance	Flash (max) 40GB/s bandwidth Disk (max) 6GB/s bandwidth 9.5K IOPS	Flash (max) 80GB/s bandwidth Disk (max) 11GB/s bandwidth 19K IOPS	Flash (max) 90GB/s bandwidth Disk (max) 12.8GB/s bandwidth 21K IOPS	
Storage – EF configuration	51 TB (raw) flash 23 TB usable	102 TB (raw) flash 46 TB usable	115 TB (raw) flash 51 TB usable	
Storage – EF performance	Flash (max) 75GB/s bandwidth	Flash (max) 150GB/s bandwidth	Flash (max) 169Gb/s bandwidth	
Oracle database versions supported	Oracle Database 12c and 11g			
Oracle Solaris versions supported	Oracle Solaris 11 and 10 Oracle Solaris 8 and 9 via Oracle Solaris legacy containers on Oracle Solaris 10			
Shared Storage	Oracle ZFS Storage ZS3-ES dual controller One disk shelf with: 20 x 4TB 7,200 rpm disks 4 x 200GB write optimized SSD			

The SuperCluster M6-32 can be expanded with an additional 17 Exadata storage expansion racks.

G-CLOUD SERVICE OVERVIEW

ORACLE DATABASE APPLIANCE

The Oracle Database Appliance X5-2 (ODBA) is an Oracle Engineered System built to deliver Oracle databases whether for online transaction processing, in-memory database or data warehousing use cases. The ODBA provides two database servers, of a similar specification to Exadata X5-2, with Oracle ASM Cluster File System storage mixed over spinning disk for data storage and SSD for database redo logs and cache. This aligns the ODBA with two database servers as per a quarter rack Exadata X5-2, without the SQL process offload and PCI flash cards provided by the Exadata Storage Servers.

The ODBA runs Oracle Database Enterprise Edition and can utilise Oracle Real Application Clusters (Oracle RAC) or Oracle RAC One Node for "active-active" or "active-passive" database service failover.

The addition of capacity-on-demand database software licensing, allows the customer to deploy their database on 2 processor cores and scale up to the maximum of 72 processor cores.

These features, combine to provide a high performance, highly available and cost effective platform for delivering Oracle database.

Element	Specification
Database Servers	2
Database CPU sockets (Intel Xeon E5-2699 v3)	4
Database CPU cores	72
Database Memory (minimum)	512 GB
Database Memory (maximum)	1,536 GB
Storage Shelves	1
Storage Shelf configuration	64 TB (raw) disk – 16 x 4TB 7.2k rpm disks
1,600 GB (raw) SSD – 4 x 400GB ME SSD for cache	
8,00 GB (raw) SSD – 4 x 200GB HE SSD for redo logs	
Storage Shelf usable capacity	32 TB double-mirrored or 21.3 TB triple mirrored
Storage expandability	Expandable to 2 Storage Shelves
Additional external NFS storage for backups, data staging or additional database files	
Internal appliance connectivity	Redundant InfiniBand interconnect between database servers
Redundant SAS interconnects to storage shelve(s)	
External network connectivity	Redundant 100/1000/10000 Base-T Ethernet
Oracle database versions supported	Oracle Database 11g Enterprise Edition Release 2 and
Oracle Database 12c Enterprise Edition	
Oracle VM supported	The ODBA supports Oracle VM allowing customers to host both databases and applications.
Capacity-on-demand licensing	The ODBA support licence scaling for Oracle Database from 2 to 72 processor cores

Each database server is provided as a minimum with 256GB memory and this can be expanded up to 768GB.

G-CLOUD SERVICE OVERVIEW

COMMODITY X86 HARDWARE

Redcentric can provide DBaaS from commodity X86 hardware, built as a bespoke database platform to meet the customer's workload requirements. The commodity platform will utilise best of breed products proven within Redcentric, with redundancy and availability features necessary to deliver a service level backed solution.

Capacity-on-demand licensing for Oracle database software is not available for commodity hardware, consequently the number of processors and cores within the database servers has to be carefully selected during the presales phase as later changes will require physical installation of new processors.

The commodity platform can utilise rack mount servers with the following per server options:

- CPU processors – 1, 2, 4 or 8 Intel Xeon processors
- CPU cores – 4, 6, 8, 10, 12, 14, 16 or 18 CPU cores per processor
- RAM – 4GB to 6TB memory
- Add-on cards – PCIe Flash cards with 800GB to 6.4TB capacity
- Storage – On board storage with spinning disk and SSD in different read/write optimised modes, or external FC SAN connectivity from flash, disk or hybrid storage arrays
- Network – 1 or 10Gbps Ethernet connectivity + optional QDR InfiniBand
- The commodity platform can utilise blade servers with the following per server options:
- CPU processors – 1, 2 or 4 Intel Xeon processors
- CPU cores – 4, 6, 8, 10, 12, 14, 16 or 18 CPU cores per processor
- RAM – 4GB to 2TB memory
- Add-on cards – PCIe Flash cards with either 1.2TB or 1.6TB capacity
- Storage – On board storage with up to 4 spinning disk or SSD, or external FC SAN connectivity from flash, disk or hybrid storage arrays
- Network – 10Gbps or 20Gbps Ethernet connectivity + optional QDR InfiniBand

Storage can be provided to database servers from either local storage or a storage area network (SAN) attached storage appliance. SAN attached storage appliances can be optimised to deliver high performance using all-flash or hybrid with a mix of flash and spinning disk for capacity. The storage appliances are configured to order and can range from 16TB to 6PB and 3,000 IOPS to 1,000,000 IOPS.

Redcentric will work with the customer to specify the commodity platform. It should be noted that the commodity platform is not a converged system and will require additional build, integration and test works to commission upon service activation.

ORACLE DATABASE OPTIONS

DBaaS provides Oracle Databases on the following versions:

- Oracle Database 11g Enterprise Edition Release 2
- Oracle Database 12c Enterprise Edition

G-CLOUD SERVICE OVERVIEW

ORACLE DATABASE SOFTWARE LICENCES

Oracle database software is licensed on processors. Redcentric and Oracle work with the customer to understand available existing licences, the intended DBaaS platforms and the required licences. The customer may choose to utilise existing government frameworks to procure Oracle licences.

DBAAS LIVE SERVICE SUPPORT

Upon service activation and customer on-boarding, DBaaS is provided with live service support, which covers the monitoring and management of the underlying service components.

LIVE SERVICE TEAMS

The live service support team will have the following roles of: service delivery manager, OS engineer and database administrator, who will include the following day to day tasks:

- Patch analysis, advice and guidance
- Advice and guidance around upgrade pitfalls, identifying what configurations are certified
- Single point of contact for escalations back into Oracle Premier Support for Oracle Engineered System incidents
- 24/7 scheduled cover for major planned system service upgrade

SERVICE DELIVERY MANAGERS

The following activities are included in the service delivery managers' team:

- Day-to-day project management in regards to managing, monitoring and supporting the DBaaS platform
- Progress, service and financial reporting
- Resource coordination
- Contract change management
- Continued technical assurance and design reviews as necessary
- QA of technical output from the activities that the technical team produce
- Assessment and advice on the technical impact of changes to the customer
- Planning the activities of the technical team such that service availability can be maximised
- Continued design and continual improvement of the processes required to manage the in-scope infrastructure
- Update operational management documentation to control the service delivery as necessary

The team will lead the operational support team to develop key technical support features of the solution such as the ability to rebuild system components, backups of physical and virtual machines, system base lining, gold image storage, system recovery procedures etc., as required.

TECHNICAL TEAM

The following activities are included in the technical team's remit:

- Day to day support
- Continuous update of the customer management database (CMDB)
- Liaising with the monitoring team to act on alerts received
- Day-to-day monitoring outside of the Oracle Enterprise Manager (OEM) monitoring, systems administration and support of the in-scope infrastructure
- Continued operational acceptance of hardware from the customer into Redcentric's control
- Continued handover of components to the monitoring team for monitoring purposes
- Refinement of operational processes and procedures under the direction of the service management team.
- User provisioning and control mechanisms

SHARED SERVICES TEAM

Redcentric underpins the live service support team with over 200 resources from the shared service team across service development, core platform management, product management, technical design architects, service delivery engineering, technical service management, data centre operations and 24 x 7 x 365 support functions.

INTEGRATION AND TOOLING

DBaaS will utilise Redcentric's existing service infrastructure. In order to perform monitoring, alerts will be forwarded from Oracle Enterprise Manager (OEM) installation, if DBaaS is delivered from Oracle Engineered Systems, to Redcentric's HP Service Manager console. Service Management will be performed using existing Redcentric's processes as adapted for use with the customer and the Redcentric's HP Service Manager. There will be no integration with the customer's service tooling solutions.

Out of hours monitoring for network, operating system, storage database and supporting infrastructure will be provided by a combination of Redcentric and Oracle ACS monitoring team (where used).

DBAAS MONITORING PARAMETERS

Redcentric will monitoring hardware components used to provide DBaaS by built-in Simple Network Management Protocol ("SNMP") framework. Once an SNMP trap is received by a SNMP listener on the gateway, within the DBaaS environment, it will be forwarded to Redcentric's network operations centre for remediation.

The following provides an example of key performance indicators associated with an Oracle SuperCluster hardware/infrastructure:

Server Sub-system Hardware – Uncorrectable CPU errors, BUS interconnect errors, IOH faults, fan/power supply faults, temperature sensor threshold exceptions, uncorrectable ECC errors, memory DIMM failures, board/backplane/paddle card failure, NIC/port/IB HCA failures

Storage Sub-system Hardware - Service processor errors, disk controller faults, storage software health, file system state, log file monitoring, flash drive faults, disk & DIMM failures, and RAID controller errors

Switch Hardware - Device shutdown, voltage/temperature threshold exceptions, fan/power supply failures, device availability ping, and CPU/memory utilisation

HARDWARE RESOLUTION & ADMINISTRATION

Redcentric will execute hardware resolution and administration tasks as defined during the live service/support design activities. The following section outlines those activities which may be included as part of DBaaS:

- Manage all Automatic Service Requests (ASR) for confirmed hardware error conditions
- Manage operating environmental conditions to prevent over-heating or damage due to power spikes.
- Perform periodic hardware diagnostic tests and run health check utilities to ensure proper functionality of infrastructure components
- Leverage iLOM sensors to monitor environmental conditions such as temperature and electrical current/voltage fluctuation to ensure proper operational ranges.
- Work with Oracle Premier Support resources in coordinating H/W replacement activities. Coordinate field replacement activities, initiate field dispatch, and manage My Oracle Service Request ticket through to resolution

OPERATING SYSTEM MONITORING PARAMETERS

Redcentric will execute operating system monitoring tasks as defined during the live service/support design activities. Additionally, where possible, Redcentric will:

- Monitor key OS life-state system processes and perform common system/event log file scanning via regular expression pattern matching
- Configure simple transactions to confirm production functionality utilising protocols designated by Oracle

All actionable events detected via this method will be passed as an incident to the Technical team. As an example, the table below shows a sample set of key performance indicators associated with Exadata database components:

Throughput / Performance	Processes / Capacity	Files / Logs/ Errors
CPU utilisation %	Process life-state	Network interface total error rate %
Swap utilisation	Total processes	syslog events
Memory utilisation	Process context switches (per second)	File or directory attribute not found
Run queue length (15 minute average)	File system capacity	File or directory permissions
Disk device busy %	Available (MB)	File or directory size (MB)
Average disk I/O service time (ms)	Processes in zombie state (%)	File or directory size change rate (KB/ minute)
CPU in I/O wait (%)	Total disk available (%)	Log file pattern matched line count
CPU in system mode (%)	Total disk space available	IP ping status
CPU in user mode (%)	Total users	
Free memory (%)		
Memory page scan rate (per second)		
Network interface combined Utilisation		
Network interface total I/O rate (MB/sec)		
Pages paged-out (per second)		
Pages scanned by page stealing daemon		
Total disk I/O per second		

OPERATING SYSTEM RESOLUTION & ADMINISTRATION

Redcentric will execute OS resolution and administration tasks as defined during the live service/support design activities. The following table details common tasks which may be included as part of the service. This should not be considered a definitive or exhaustive list of management and administration tasks - a more comprehensive list of tasks will be created during service implementation and is updated by Redcentric over the term of the contract to specifically address the needs of the customer.

Throughput / Performance	Processes / Capacity	Files / Logs/ Errors
Review the CPU utilisation and process priority of critical system and application processes. Identify potentially non-critical or high impact activities that can be removed or more effectively scheduled to reduce system load.	Extract the detail of the log event and correlate the event with additional performance metrics (e.g., server, network, DB, etc.) to identify the root cause.	Provide bare metal operating system re-installation and restore of core SuperCluster infrastructure. (Oracle Enterprise Linux, Storage Cells, Oracle RDBMS (Oracle 11gr2)
Manage the number of inodes allowed on a given file system. As needed, clear existing files (i.e., remove temporary files to clear existing inodes) or increase the kernel parameter controlling the maximum allowed inodes.	Leverage defined standard shell auto-restart scripts for core system daemons. If this fails, Oracle Tier II technicians will use defined start methods to bring the services back on line.	Perform regular log file rotation and archiving
Review the memory utilisation of critical system and application processes to see which is causing significant paging. Process priorities can be adjusted to ensure a process of high importance/frequent use stays in virtual memory.	Review monitored error log files for warnings and errors to identify potential issues within the OS not identified by core monitoring solution.	Facilitate operating system parameter changes, as needed, to ensure optimal availability and performance
Review the resource utilisation of critical system and application processes to attempt to determine which is causing significant paging. Determine the impact of excessive paging, and make performance recommendations accordingly.	Review monitored OS log files for errors and warnings. Ensure the information is being captured accurately and correctly classified within our monitoring. Look for potential errors or warning conditions that are not being captured by the monitoring solution	Create/modify/maintain local accounts, permissions, and administrative rights
If memory or swap utilisation exceeds thresholds, review the processes that are consuming the most memory (physical and virtual) to try to determine the cause. If the cause impacts performance, remediate the problem, and work with the customer to determine the appropriate long-term solution	Periodically log into each device to verify that access methods and passwords are correct in the password vault.	Review and update OS threshold settings as required
Define specific file system components that can be removed / temporarily re-located. Based on this information, take the appropriate steps to ensure file system capacity does not become full and impact processing.	Perform server restarts as required	
Identify potentially non-critical or high impact activities that can be removed or more effectively scheduled to reduce system load.	Review events received and identify tuning opportunities. Tuning can include filtering alarms, re-classifying severities, associating internal knowledge base entries, and creating custom monitoring	

DATABASE MONITORING PARAMETERS

Redcentric will execute data monitoring tasks as defined during the live service/support design activities. Oracle Enterprise Manager will typically be leveraged to facilitate the data collection and monitoring activities. A sample set of key performance indicators associated with the underlying database components is shown in the table below:

DB Health	Logs/Errors	Space Management	Performance	RAC
Listener status	Monitor Oracle errors in alert log	Tablespace usage	Dictionary and library cache hit ratio	Cluster health and RAC instance status
Commit/rollback failure	Archive logs usage	Space/files fragmentation	Disk sort ratio	Cluster cache and coherency
RMAN backup success/ failure	Online redo log switches	Tablespace UNDO usage	DB block buffer cache hit ratio	RAC blocking session count
Invalid objects	Data block corruption	Temp table space usage	Latch hit ratio	RAC average response time
Inactive sessions	Max sessions and processes exceeded		Buffer cache read hit ratio	RAC process status – CSS, CRS, ONS, RACG, OPROCD
Rollback segment waits	Datablock corrupted		High CPU processes	Private interconnect transfer rate
Active sessions	Data file error		Long running jobs	

DATABASE RESOLUTION & ADMINISTRATION

Redcentric will execute database resolution and administration tasks as defined during the live service/support design activities.

The System DBA (as opposed to the application DBA, which remains under the control and ownership of the customer) is responsible for

- All defined ad agreed backup and restore processes
- All storage changes, addition or moving of data files, extending table spaces
- Node crashes – fail over outside of business hours (in hours it would be apps DBAs)
- For major incidents both apps and sys DBA to be on the call and the roles decided on the day depending on the incident
- Monitoring alert logs, fault logs and resolution of any issue
- Proactively look for database hangs = create incident, where not picked up the customer's application DBA monitoring

The demarcation lines /role and responsibilities are further defined below:

Tasks	Owner
Deployment of Releases	Customer
Deployment of application packages	
Creating new user Granting privilege to new user Granting privilege to existing users	
Creating database directories	
Taking schema,table level logical backups	
Session monitoring/killing/locking issues/user unlock	
Resizing UNDO/TEMP tablespaces	
Performance Monitoring, producing AWR/ADDM reports	
OWB start/stop service	
Application start/stop	
Providing permissions to app start scripts by root user	
Maintenance and archive of Application logs	
Providing permissions to mount points	
Housekeeping on application boxes root partition	
Database Listener stop/start/edit Update tnsnames.ora	Supplier
Adding space to existing tablespaces Adding new tablespaces	
Taking physical backups(cold/hot backup)	
Physical backup restoration	
Maintenance of Archive logs/Flashback logs	
Database Memory Management (SGA,PGA,swap etc)	
Taking restore points	
resizing UNDO/TEMP tablespaces	
Adding additional storage as and when required	
Apply Oracle patches	
Applying Solaris patches	
Solaris level issues e.g. memory issue,space issue, mounting issue, access control to directories, network issues	

G-CLOUD SERVICE OVERVIEW

The following table details common tasks which may be included as part of DBaaS. This should not be considered a definitive or exhaustive list of resolution and administration tasks. A more comprehensive list of tasks will be created during live service/support design and will be updated Redcentric over the term of the contract.

DB Health	Logs/Errors	Space Management
Coalescing RDBMS tablespaces	Monitor database usage	Database index re-orgs and rebuilds
Start/stop DB instances, listeners, and DB servers	Analyse tables/schemas for optimization	Move indexes between table spaces as needed
Check/re-compile schema's invalid objects	Space management (space parameters, file management, storage requirements)	Manage archived redo logs rotations
Measure Oracle processes activity & manage potential runaway processes	Database statistics collection and analysis	DB capacity reporting
Manage dispatcher workload	Database object level sizing collection	Daily log file cleanup, log rotation, and log file archiving
Manage usage of sessions, prompts and connections	Evaluate chained-rows	Clear out database server logs
Perform database dumps/exports	Evaluate fragmentation	Purge old archived redo logs
Schedule process restarts	Check data block corruption	Online redo log switching
Database configuration file review	Perform schema management	Compress archived online redo logs
Manage RAC services via: CVS, SVRCTL, CRSCTL, OIFCFG	Fix/relieve space fragmentation	
Configure RAC workload management and dynamic resource allocation		
Modify connection load balancing configurations as needed		

Administrative Task	Description
Review database dumps	Review alerts for dump exceptions
Review database update statistics exceptions	Review alerts for "update statistics" exceptions.
Review log file clean-up exceptions	Review alerts for log file cleanup exceptions.
Verify database export	Verify completion of automated job.
Verify analysis of database schemas	Verify automated object statistics collection job.
Review database usage	Check whether the database needs additional space.
Review database log files	Review database log files for errors and warnings not associated with the Incident tickets.
Verify collection of database statistics	Verify automated data collection via OEM Grid Control
Verify completion of database object level sizing collection	Verify successful completion of jobs
Verify completion of database index rebuild	Verify the successful completion of the database index rebuild job.
Rebuild database index	Rebuild the indexes as necessary
Perform DB performance evaluation	Redo log / checkpoint analysis, log switch frequency, size, and checkpoint frequency.
Perform DB performance evaluation	Roll back the segment analysis.
Perform DB performance evaluation	Perform monthly analysis of statistics, provide resource intensive SQL for tuning, recommend memory and tuning parameters, redo logs, roll back segments, etc.
Perform DB object evaluation - extent/ space fragmentation	Perform monthly analysis of extent/space fragmentation. This is dependent upon Customer implementation. The use of locally managed table spaces instead of dictionary managed table spaces has alleviated the need for frequent object reorganisation.
Perform DB object evaluation - Chained-row or forwarded record tables	Perform monthly analysis of database objects for tables with chained-rows. Perform table reorganisation as needed.
Review database log files	Review monitored database log files for errors and warnings. Ensure the information is being captured accurately and correctly classified within our monitoring. Look for potential errors or warning conditions that are not being captured by the monitoring solution.
Review trending data for issues	Review of Customer event reporter report incidents for proactive trending of network devices to see if there may be issues.
Review database log	Review trends in database log alerts to identify potential monitored database performance enhancements and efficiency opportunities.
Review database log files	Review trends in monitored database logs to identify potential issues with the database.
Review database log files	Review database log files for errors and warnings not associated with the Incident tickets.
Review thresholds and alert settings	Review the thresholds and alert settings for database file systems.
Review thresholds and alert settings for memory	Review the thresholds and alert settings for memory to ensure maximum database performance.
Review thresholds and alert settings for CPU	Review the thresholds and alert settings for CPU to ensure maximum database performance.
Review database user-simulated monitoring	Review and validate user-simulated monitoring. Ensure that the user-simulated monitoring accurately tests the database components. Ensure that these monitors are associated with appropriate Internal Knowledgebase entries.
Review monitoring	Review deployed storage monitoring to ensure completeness of the monitoring solution

STORAGE MONITORING PARAMETERS

Redcentric will execute storage monitoring tasks as defined during the live service/support design activities. Oracle Enterprise Manager Grid Control and Oracle Advanced Storage Manager (ASM) products will typically be leveraged to facilitate the data collection and monitoring activities for Oracle storage environments. As an example, the table below shows a sample set of key performance indicators associated with Exadata storage components:

Metric	Metered System Component	Metric Explanation	Metric Class	Metered System Component
Flashcache used (MB)	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
IORM boost	Storage cell metrics	Cell offload efficiency	Performance	Oracle Exadata storage server
Memory utilisation (%)	Storage cell metrics	Memory buffer usage	Performance	Oracle Exadata storage server
Offload efficiency	Storage Cell Metrics	Cell offload efficiency	Performance	Oracle Exadata Storage Server
Rcv (MB/s)	Storage cell metrics	Infiniband throughput	Performance	Infiniband
Read requests per sec	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
Read throughput per sec	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
Write requests per sec	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
Write throughput per sec	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
Xmt (MB/s)	Storage cell metrics	Infiniband throughput	Performance	Infiniband
Total Celldisk small read latency	Storage cell metrics	Celldisk small read wait	Performance	Oracle Exadata storage server
Total Celldisk small write latency	Storage cell metrics	Celldisk small read wait	Performance	Oracle Exadata storage server
Filesystem utilisation (%)	Storage cell metrics	Cell capacity (disk space utilisation)	Usage & business indicators	Oracle Exadata storage server
Total Celldisk read requests	Storage cell metrics	Celldisk read req/sec	Usage & business indicators	Oracle Exadata storage server
Total Celldisk reads (MB)	Storage cell metrics	Celldisk read throughput	Usage & business indicators	Oracle Exadata storage server
Total Celldisk write requests	Storage cell metrics	Celldisk write req/sec	Usage & business indicators	Oracle Exadata storage server
Total Celldisk writes (MB)	Storage cell metrics	Celldisk write throughput	Usage & business indicators	Oracle Exadata storage server
Total disk I/O per second	Storage cell metrics		Usage & business indicators	Host
Database large IO wait/request	DB server	Large IO wait	Performance	Oracle Exadata storage server

Metric	Metered System Component	Metric Explanation	Metric Class	Metered System Component
Database Small IO wait/request	DB server	Small IO wait	Performance	Oracle Exadata storage server
Database large IO requests/sec	DB server	Large IO Req	Usage & business indicators	Oracle Exadata storage server
Database small IO requests/sec	DB server	Small IO req	Usage & business indicators	Oracle Exadata storage server
Usable flash recovery area	Storage cell metrics	Flash cache effectiveness	Performance	Oracle Exadata storage server
ASM exception monitoring	Storage cell metrics	ASM errors	Performance	Oracle Exadata storage server
Storage cell alert	Storage cell metrics	Basic alert	Performance	Oracle Exadata storage server
File system Capacity	Storage cell metrics	Basic alert	Performance	Oracle Exadata storage server
LUN status	Storage cell metrics	Basic alert	Performance	Oracle Exadata storage server
Physical disk status	Storage cell metrics	Basic alert	Performance	Oracle Exadata storage server

STORAGE RESOLUTION & ADMINISTRATION

Redcentric will execute storage monitoring tasks as defined during the live service/support design activities. Oracle Enterprise Manager Grid Control and Oracle Advanced Storage Manager (ASM) products will typically be leveraged to facilitate the data collection and monitoring activities for Oracle storage environments. As an example, the table below shows a sample set of key performance indicators associated with Exadata storage components:

Disk Groups	General	General
Manage ASM disk groups & disk group directories	Manage and report on file system and storage allocation	Manage ASM authentication parameters
Perform ongoing disk group capacity management	Re-size cluster filesystems and volumes	Support ASM user/group/password administration
Create and maintain ASM disk group mirroring and redundancy	Configure and tune ASM automatic memory management if applicable	Configure newly migrated databases to leverage ASM functionality
Evaluate disk group performance and compatibility	Adjust large-pool and shared-pool sizes if applicable	Create new ASM tablespaces
Check for internal consistency of disk group metadata	Modify database initialisation parameters if applicable	Manage ASM alias names
Drop/modify disk groups as needed	Ensure CSS communication with ASM	Create, maintain, and restore ACFS snapshots
Leverage ASM dynamic views for disk group visibility	Manage all ASM background processes	Pin objects in the flash cache
Perform periodic bad-block recovery	Backup ASM files	Create logical disks from flash cache
Manage Hybrid Columnar Compression processes	Leverage various ASM command-line utilities as needed	

Administrative Task	Description
Analyse storage configurations	Ensure that one loss will not result in data loss.
Deploy array firmware patches	Deploy security patches released by vendors or if released by CERT.
Clean up log file (weekly)	Review alerts for log clean-up exceptions.
Review disk performance	Review disk IO cache utilisation.
Review disk utilisation	Review disk array capacity, both configured and un-configured
Verify disk array statistics collection	Verify automated collection of BA data.
Review and update storage documentation	Review and update documentation for any changes on zoning, firmware, software patches, or upgrades.
Review disk array logs	Review log files for errors and warnings. Ensure the information is being captured accurately and correctly classified within our monitoring. Look for potential errors or warning conditions that are not being captured by the monitoring solution.
Review trending data for issues	Review the customer Event Reporter report incidents for proactive trending of network devices to see if there may be issues.
Review log files	Review the log files for errors and warnings not associated with the incident tickets.
Review monitoring	Review deployed storage monitoring to ensure completeness of the monitoring solution

DBAAS PLATFORM ENVIRONMENT PATCHING

Redcentric will execute DBaaS platform environment patching tasks as defined during the live service/support design activities.

BACKUP AND REPLICATION

Redcentric will work with the customer and Oracle to select and refine the backup processes required for DBaaS. Additional replication activities may be involved depending upon the number of DBaaS platforms and data centres involved. Typical Oracle Database and Oracle Engineered System deployments will utilise the following:

- Nightly backup to local ZFS appliance in the production, keeping 7 days retention, using image copy backups which are and then replicated to the disaster recovery datacentre using ZFS replication
- Asynchronous replication of the production database to the disaster recovery data centre using Dataguard

CHANGE MANAGEMENT

Changes having a commercial impact will following the G-Cloud contract change process.

Changes with no service impact will not require approval by the customer. At the discretion of Redcentric the customer may have visibility of these changes. The following example changes for which Redcentric would not expect to require notification or approval by the customer:

- Replacement of an already failed redundant disk
- Alteration of system parameters that do not require a reboot or application restart
- Addition of new functionality (e.g. more resources, more infrastructure software)
- Upgrade of infrastructure components, e.g. hardware or software, e.g. supporting LAN switches

The customer would be asked for approval for any changes which affects the live service. This includes changes which affect the redundancy of a service specific component, e.g. even though there may be two application servers, the customer needs to approve the reboot of one of the two servers. The same applies for restarting of failed components, e.g. restart of a failed application server. This is required because restarting the application server may have further impacts on the service, depending on design, which is outside the scope of Redcentric.

Furthermore, the customer will be informed of changes that reduce redundancy, even if temporarily, e.g. upgrade of firmware of one part of a mirror or one part of a network switch.

OPTIONAL SERVICES

Redcentric can provide additional services to complement the core service. Redcentric and Oracle work with the customer, as part of the pre-contract phase, to scope the additional services required.

NETWORK CONNECTIVITY SERVICES

Redcentric can provide network connectivity services.
(please see page 30)

ADDITIONAL ORACLE PLATFORMS

Redcentric can provide or hosted customer provided equipment, such as:

- Oracle Exalogic Elastic Cloud
- Oracle Private Cloud Appliance
- Sun ZFS Storage Appliance
- Oracle Exalytics In-Memory Machine
- Oracle Big Data Appliance

G-CLOUD SERVICE OVERVIEW

MANAGED DESKTOP SERVICES

Redcentric can provide hosted desktops to support access to customer services hosted on DBaaS.

INFRASTRUCTURE AS A SERVICE

Redcentric can provide Infrastructure as a Service (IaaS) to support access to customer services hosted on DBaaS.

MANAGED BACKUP SERVICE

Redcentric's Managed Backup Service (MBS) can provide offsite backup of customer data to an alternate Redcentric data centre, to protect against data loss from corruption or failure of the primary environment. MBS includes:

- Agent software to be installed on the customer's servers to process backup and restore data
- Vault hosted in an alternate Redcentric data to store customer backup data
- Web portal to provide a self-service portal for the customer to operate the service

HOW MBS WORKS

MBS relies on three components: the director, agent and web portal:

- The director, which is hosted and managed by Redcentric, controls a vault for data storage. The director maintains the integrity of the vault and control access to the vault
- The web portal, which is hosted and managed by Redcentric, is to be used by the customer to manage backup tasks and data restores
- The agent is installed onto customer servers to be protected. The agent communicates with the director to backup or restore server data and with web portal for task management
- The agent will respond to its backup task, configured on the web portal, and send the server's data directly to director for storage in the vault
- Should a restore be required, the customer will connect to the web portal to initiate the restore process

AGENT PLUGINS AND SUPPORT PLATFORMS

The agent is a lightweight application running on the server to be protected. The agent executes backups on the server based on parameters configured via the web portal. When a backup task is due for execution, the agent reads the backup task parameters and executes the backup accordingly.

The parameters that define a backup are referred to as a task. One or more backup tasks may be created to implement the backup necessary to protect a server. Each time a backup is executed a log file is created and a catalogue is created. The log file is an audit trail for the backup and displays the start time, connection information, statistics and summary information regarding the backup. The catalogue is an index for all the files that are contained in the backup. The catalogue contains file attribute information, dates, full directory information, and sizes. The catalogue information is used to search for files, as well as browse, and initiate restores. At the director, the data for each backup is contained in its own safeset.

The agent executes restores in a similar manner to backups. A restore definition file is created containing the parameters necessary to complete a restore of all or a subset of files in a specific backup. The agent makes a connection to the director. The director locates the safeset (based on the catalogue), finds the requested file(s), and the agent receives the file data from the server.

The agent supports the following customer operating systems and applications:

- Microsoft Windows Server
- Solaris
- Linux
- Microsoft Exchange Server
- Microsoft SQL Server
- VMware vSphere

The agent can be deployed to support the following customer operating systems and applications, although these will not be directly support by Redcentric:

- IBM AIX
- HP UX
- Oracle Database on Microsoft Windows Server
- Microsoft Hyper-V

Redcentric endeavour to provide agents that support the above operating systems and applications in-line with each vendor's support and end of life cycles. A full list of supported versions and service levels can be found here: www.redcentric.co.uk/downloads

BACKUP SOURCE TYPES

There are multiple source types that can be selected for backup.
The options are:

- Local drive
- UNC backup
- Microsoft Exchange Server
- Microsoft SQL Server
- Oracle Database
- Virtual Machine on VMware vSphere
- Virtual Machine on Hyper-V

ENCRYPTION, DELTA PROCESSING AND STORAGE

Customer backup data is encrypted in transit and at rest by default. The customer will enter an encryption pass-phrase as part of the backup task configuration. The encryption pass-phrase is required for each restore.

Loss of the encryption pass-phrase means that data from the backup task cannot be restored.

For the avoidance of doubt, Redcentric have no visibility of the encryption pass-phrase and retention of the encryption pass-phrase is the responsibility of customer.

The first time a backup task runs the agent will compress and encrypt the backup data before transmission to the director. This process is referred to as a seed backup and will typically store 50% of source data volume. The seed backup generates the first safeset for the backup task.

Subsequent backups will utilise delta processing to detect changes since the last backup. The backup data changes will be compressed and encrypted before transmission to the director.

Each backup completion generates a new safeset. For a particular backup task, the backup data stored will consist of the seed safeset and multiple delta safesets.

The director manages the lifecycle of backup data in line with backup policies, by expiring, optimising and deleting safesets in the vault. All backup data will be stored as safesets in the vault.

BACKUP SCHEDULES

MBS has an extensive calendar based scheduler for automatically executing backup sets. Schedules can be defined to execute backups daily, weekly, monthly, or on a more defined frequency, such as the last day of the month.

Multiple schedules can be defined, and multiple backup sets can be associated with a schedule. Where multiple backup sets are associated to a schedule, the customer's system administrator can define the number of concurrent backup sets to be executed and the priority in which they should be executed.

SOFTWARE LICENSING

Redcentric can assist the customer with license enablement and fulfilment as required by specific vendors, such as Oracle, Microsoft, Citrix and Red Hat.

Oracle database software is licenced on processors. Redcentric and Oracle work with the customer to understand available existing licences, the intended DBaaS platforms and the required licences. The customer may choose to utilise existing government frameworks to procure Oracle licences.

The support DBaaS infrastructure may will require appropriate operating system and software licences. Redcentric will work with the customer to understand the licences required for these platforms.

For environments where the customer is using Microsoft software, the customer cannot bring their Microsoft licences onto Redcentric hosted services, such as shared IaaS, except where:

- The server hardware is physically dedicated to the customer
- Microsoft licence mobility applies
- The customer has an existing service provider licence agreement with Microsoft

The customer must notify Redcentric of any Microsoft software that it intends to operate on the service, to allow Redcentric to identify the correct licensing method. For licence mobility use cases, Redcentric will work with the customer to work through the process. For all cases where the customer cannot bring their licences, Redcentric will provide licences as a separate monthly charge.

Redcentric will provide a Microsoft Windows Server licence for all customer servers deployed via IaaS.

Microsoft licence mobility allows the customer to host their licences with an approved Microsoft licence mobility partner, such as Redcentric and is limited to the six server products listed below. Licence mobility requires the customer to have valid software assurance for duration of the product being hosted with Redcentric. The six eligible Microsoft server products are:

- Microsoft SQL Server database server
- Microsoft Exchange server
- Microsoft SharePoint server
- Microsoft Lync server
- Microsoft System Center server
- Microsoft Dynamics CRM business software

Software assurance is included with some Microsoft volume licensing programs, such as an enterprise agreement and can be purchased as an add-on to other programs.

INFORMATION ASSURANCE

Redcentric has delivered secure hosting solutions to the Public Sector for a number of projects

The below list details the Accreditations and Standard Redcentric complies with our is certified to:

Authorised to process HM Government protectively marked data	✔
Actively engaged within the HSCN & PSN programs	✔
An NHS Health & Social Care compliant commercial third party	✔
An NHS Health & Social Care accredited N3 Service Provider	✔
Accredited to connect and supply services over the JANET academic network	✔
Adhere to PCI/DSS payment card standards	✔
Accredited to the ISO9001 quality management standard	✔
Accredited to the ISO27001 security management standard	✔
Compliant with the ISO31000 standard for risk management	✔
Compliant with Cabinet Offices Security Policy Framework, Information Assurance standards 1,2,4,5,6 & 7	✔
and the Management of Risk framework	✔
IGT	✔
Authorised to process and store Person Identifiable Data (PID)	✔

INFORMATION ASSURANCE

In addition to the above Redcentric also has in place the following CESG, Cabinet Office and Other Government Standards

CESG, CABINET OFFICE AND OTHER GOVERNMENT STANDARDS

Document	Title Author
HMG Security Policy Framework	Cabinet Office
HMG Information Assurance Standard Nos.1&2 – Information Risk Management	CESG
HMG Information Assurance Standard Nos.1&2 – Supplement: Technical Risk Assessment & Risk Treatment	CESG
Technical Threat Brief No 1 - Assessment of Technical Threat	CESG
HMG Information Assurance Standard No.4 – Management of Cryptographic Systems	CESG
HMG Information Assurance Standard No.5 – Secure Sanitisation	CESG
Good Practice Guide No.7 - Protection from Malicious Code	CESG
HMG information Assurance Standard No.7 -Authentication of Internal Users of ICT Systems Handling Government Information	CESG
Good Practice Guide No.8 – Protecting External Connections to the Internet	CESG
Good Practice Guide No.13 – Protective Monitoring for HMG ICT Systems	CESG
Good Practice Guide No.14 - UK Requirements for TEMPEST Countermeasures	CESG
Good Practice Guide No.32 – Audit Handbook for CESG Assured Service (Telecoms)	CESG
Good Practice Guide No.47 – Information Risk Management (including Accreditation & RMADS)	CESG
Security Procedures – Telecommunications Systems & Services	CESG
BS ISO/IEC 27001:2005 – Information technology. Security techniques. Information security management systems – Requirements.	ISO
BS ISO/IEC 27002:2005 Information technology. Security techniques. Code of practice for information security management.	ISO

INFORMATION ASSURANCE

Redcentric can confirm we also meet the requirements of the following industry laws and guidelines:

INDUSTRY COMPLIANCE REGISTER

Unauthorised Disclosure of Official Information:

- Official Secrets Act 1911
- Official Secrets Act 1989

Official Disclosure:

- Public Records Acts 1958 and 1967 Data Protection Act 1998
- Freedom of Information Act 2000
- Human Rights Act 1998

Communication and Information Systems

- Computer Misuse Act 1980
- Copyright (Computer Programs) Regulations
- Civil Evidence Act 1968 and the Police Criminal Evidence Act Wireless Telegraphy Act 1949
- The Communications Act 2003
- Regulation of Investigatory Powers Act (RIPA) 2000
- The Telecommunications (Lawful Business Practise) (Interception of Communications) Regulations 2000

Miscellaneous:

- Copyright Designs and Patents Act 1988
- Health and Safety at Work Act 2998

ON-BOARDING PROCESSES / SCOPE

SERVICE ACTIVATION & ON-BOARDING PROCESS

Redcentric will provide professional services to assist the customer with the service activation. This will encompass, but is not limited to:

- Project management
- Discovery and design tasks to select the platforms required to support DBaaS
- Data centre, network and data infrastructure design and build
- Platform procurement and commissioning
- First cut migration of customer data from existing to the DBaaS platform
- Functional / non-functional testing and assurance
- Design optimisation, such as improving database configuration, to utilise the new infrastructure
- Live service / support design, process documentation
- Departmental security accreditation
- Backup and disaster recovery design, implementation and testing
- Additional customer data migrations
- Go live operational support
- Live service transition into support

ON-BOARDING PROCESSES / SCOPE

Redcentric and Oracle work with the customer during the pre-contract phase to understand the on-boarding requirements. At a high level this process will involve:

- Customer and Redcentric engage via g-cloud
- Oracle, Customer and Redcentric scope the project to specify:
  - » Oracle hardware and licenses required
  - » Oracle consulting services required for on-boarding
  - » Oracle support services required during the contract term
  - » Complementary services required, such as backup, disaster recovery, middleware platforms, network connectivity
  - » Database on-boarding requirements, such as database migration technique and professional services required
- Contracted awarded
- Hardware procured, commissioned and tested
- Network connectivity procured, commissioned and tested
- Complementary services procured, commissioned and tested
- Database on-boarding commences
- Database transitions into production

Redcentric can facilitate use of Oracle Consulting Services to assist the customer with database on-boarding. The quantity and level of skills is agreed during the pre-contract scoping phase. The charge for these in detailed in the SFIA rate card.

Redcentric will assign a dedicated Project Manager as a single point of contact for the delivery of all services to the customer, who will engage with the relevant customer staff at the earliest possible stage, to ensure full project lifecycle management. In addition, there will be a minimum of 2 (PRINCE2 qualified) Project Support staff assigned to assist the Project Manager throughout the delivery, ensuring continuity of service. In addition, the Service Delivery department operates a clearly defined escalation hierarchy to ensure the prompt resolution of any concerns or queries.

The implementation of the Service will be managed by a dedicated team of delivery engineers and project managers. Redcentric's Project Managers are registered PRINCE2 Practitioners, having a wide and diverse portfolio of skills based on previous experience and the requirements for delivering Redcentric's services. The team has a combined wealth of experience, gained from a variety of I.T. industry sectors.

The Redcentric project manager will:

- Contribute to Project Initiation Documentation as and when desired;
- Agree and adopt a well-defined Communication Strategy and Communication Plan with customer at the earliest opportunity;
- Liaise with customer to ensure that a Project Kick-off Meeting is held at the earliest opportunity, between all resources involved, to discuss and agree roles and responsibilities, deliverables, timeframe, migration strategy and testing procedures;
- Hold regular planning Meetings/Calls (as defined by the customer) throughout the lifecycle, where the previous stage of work is reviewed and the next stage of work examined in detail;
- Issue regular project updates (frequency determined in agreement with the customer), in addition to regular Checkpoint and Highlight Reports as required by the customer;
- Ensure the customer approval and signoff of migration plans and any associated documentation
- Hold a full project "lessons learned" review when all services have been delivered/migrated and fully document these, to be issued to both parties with the aim of continual improvement.

ACCEPTANCE

The following acceptance criteria will be demonstrated during the service delivery process and the Customer's signed approval will signify that MDBS as described in this Service Definition is ready for use:

- Verify the Customer can access each database as it is created on or migrated to MDBS

The Customer will need to nominate (pre-installation) and make available an appropriately qualified representative to work with the Redcentric representative during the service delivery. The nominated Customer representative will accept delivery of MBDS as a fully commissioned service and sign the service sign-off document and return this to Redcentric. The installation will be carried out between 09:00 - 17:30, Monday–Friday, except where agreed with the customer

OFF-BOARDING PROCESSES / SCOPE

Redcentric will work with the customer to provide an orderly transition off the DBaaS service. Redcentric will assist the customer to generate an exit plan that details:

- The transition of the DBaaS service to a replacement supplier with the minimum of disruption
- Provide an estimate of Redcentric transition assistance required
- Provide an estimate of the Redcentric personnel that may be required to provide transition assistance to the customer to execute the exit plan
- Provide a list of backups and storage on which customer data is hosted and needs to be migrated to the customer or a replacement supplier.

TRANSITION ASSISTANCE

The transition assistance shall include any one or more of the following:

- Providing expertise and assistance to the customer to execute the exit plan
- Providing technical advice to the customer or replacement supplier to facilitate provision of the replacement service
- Decommissioning of hardware and other infrastructure
- Providing data clearing/cleansing services

Redcentric will be entitled to charge the customer for time and material spent by Redcentric and its sub-contractors to execute the exit plan.

OUT OF SCOPE FEATURES

The following elements are out of the scope of the IaaS service:

- Customer software application software licenses agreements. The customer will work with their software application vendor to ensure that the application software used is correctly licensed. Redcentric will support the process where necessary, for example provide processor specifications for processor based licenses.
- Customer application, design, installation and support. The customer shall be responsible for design, installation and support of the software applications operating on the DBaaS service.

DETAILS OF THE LEVEL OF BACKUP/RESTORE AND DISASTER RECOVERY THAT WILL BE PROVIDED;

The standard DBaaS services are provided with:

- High availability features within a single data centre to protect against component failure, allowing the service to survive a host, switch, storage controller or disk failure
- Data is stored in a Redcentric UK data centre
- DBaaS can be enhanced with offsite backup and disaster recovery, where data is copied to a second Redcentric UK data centre. The combination of backup and disaster recovery provides both geographic and technology separation.

PROFESSIONAL SERVICES

Redcentric provide inclusive professional services within the delivery of DBaaS, covering:

- Presales consultation for Redcentric services
- Completion of all supporting documentation (Schematics and schedules)
- Provision of services as per the supporting documentation

Redcentric provide additional chargeable professional services to cover:

- Oracle Consulting Services
- Live Service Team, including:
  - » Service Delivery Manager
  - » Operating System Engineer
  - » Oracle Database Administrator
- DBaaS & support platform service design
- Live Service design
- Excess engineer time (incurred through additional onsite works required, customer delays or lack of site readiness)
- Specialist disaster recovery / business continuity planning and implementation
- Business and technical strategy planning
- Out of business hours installations
- Failed appointments
- Follow up technical consultations such as redesign workshops
- Specialist post implementation design work – for example full migration planning, documentation and implementation

CONNECTIVITY

Robust connectivity between an individual end user and the cloud services that user needs to access is essential. Consequently Redcentric designed, built and continues to operate its UK-wide core network, retaining full control. The network was built to deliver the highly available, stable connectivity required for users to access business critical applications. To maximise resilience, multiple carriers provide the core connectivity and routing and switching devices are used from market leaders Cisco Systems.

The Redcentric highly resilient, high capacity core has connections to the following 3rd party networks to provide multiple options for users wishing to access cloud services, applications and data:

- Geographically resilient connectivity to multiple tier-1 Internet transit providers and Internet exchanges
- Geographically resilient connectivity directly into the inner core of the NHS N3 Healthcare network
- Geographically resilient connectivity into the JANET education network
- Geographically resilient connectivity into the Public telephone network
- Geographically resilient connectivity into several major carrier's broadband and Ethernet access networks

Dependent upon specific requirements, customers can therefore access Redcentric centralised cloud services via the internet, via an existing Janet or N3 connection or via a direct, private circuit using one of the technologies listed below:

- 100Mbps and 1Gbps Ethernet fibre access
- Copper Ethernet access (EFM) providing speeds between 2 and 35Mpbs
- Cellular mobile access – ie. 3G & 4G
- ADSL fixed-rate, ADSL Max, ADSL 2+, or shared fibre (FTTx) broadband access.

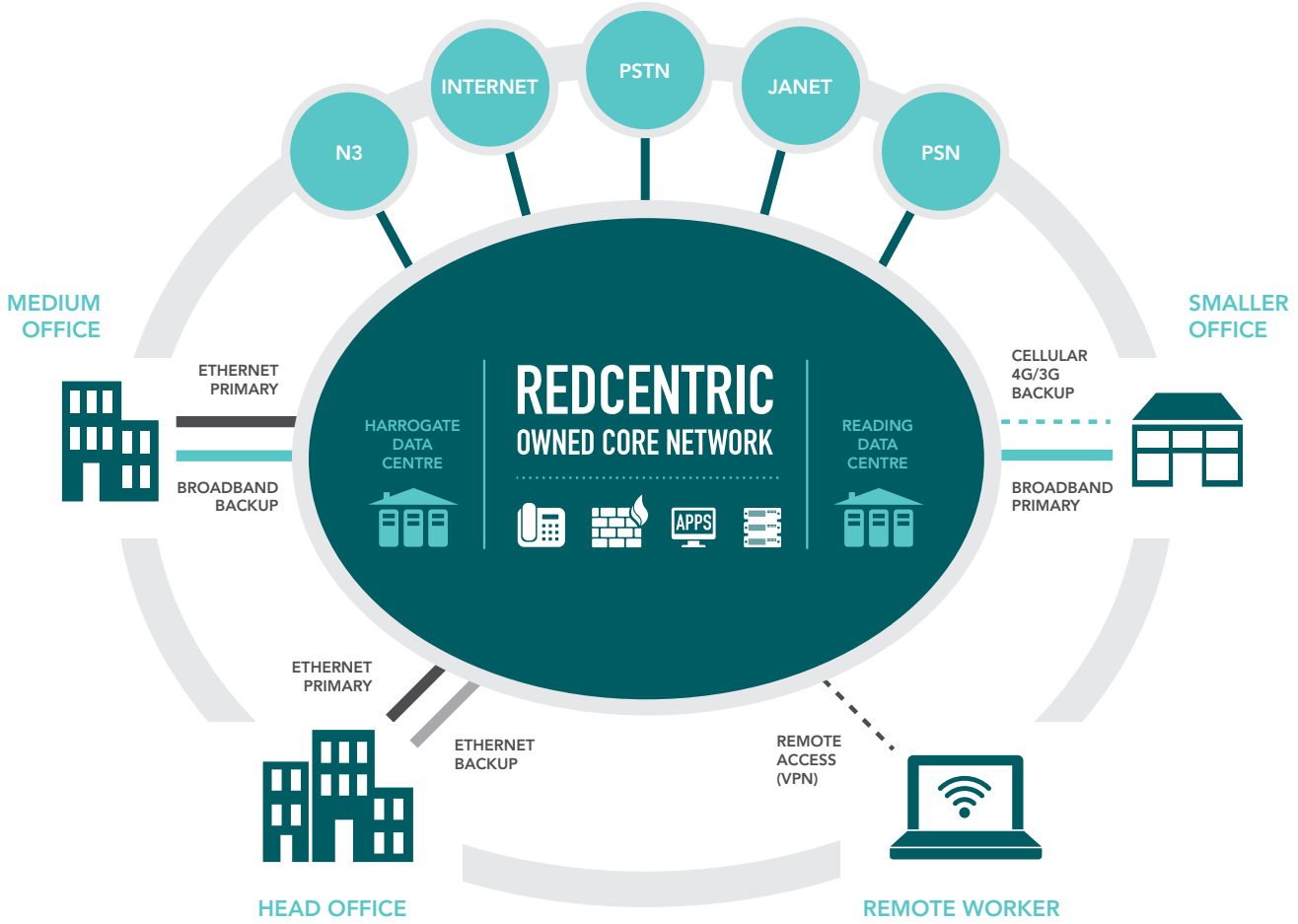


Diagram showing options to access Redcentric cloud services

CONNECTIVITY

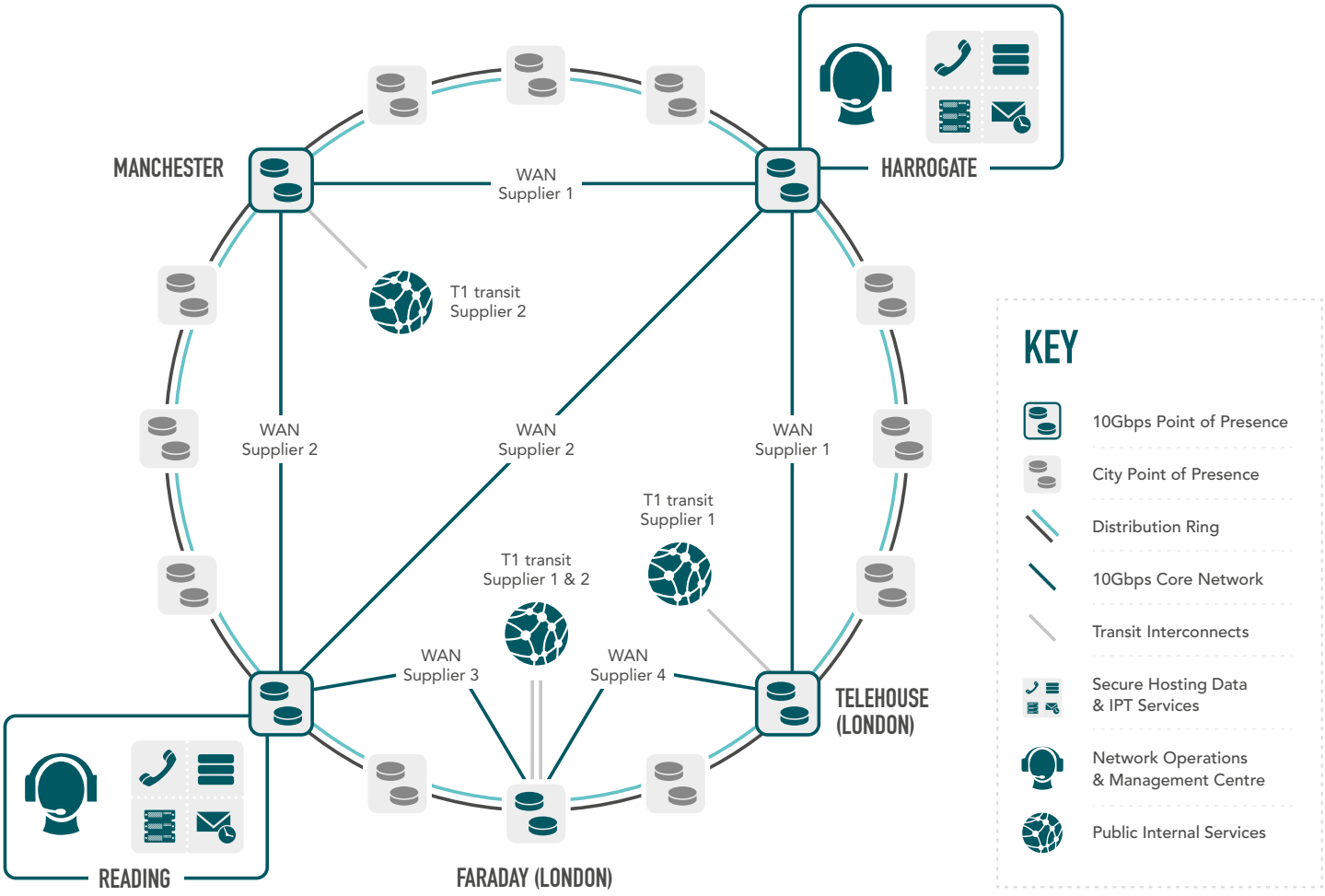
Where customers wish to deploy a private circuit from one or more of their sites to the Redcentric core, Redcentric undertakes the following tasks as part of the Managed Connectivity Service allowing the customer to concentrate on their core business:

- Identification of the best technology and supplier to meet specific connectivity requirements
- Design connectivity solution including any resilience, QOS and convergence objectives
- Project Manage the implementation of the solution
- Procure, configure, deploy and test all components
- Provide 24x365 monitoring with proactive fault management
- Provide access to performance reporting information

REDCENTRIC'S 10GBPS CORE AND DISTRIBUTION NETWORKS

Redcentric's key POPs and Data Centres are connected via a 10Gbps core backbone where each site connects to at least two others using different carriers.

The 10Gbps network is further enhanced by a 2.4Gbps distribution network that has POPs situated in major cities around the UK. POPs are used for directly connecting client sites in major cities to the Redcentric network, typically using short-haul Ethernet connections.



CONNECTIVITY

INTERNET CONNECTIVITY

Redcentric's Internet connectivity service provides robust Internet connectivity to customer sites and to customer environments within Redcentric data centres. Redcentric has fault-tolerant interconnections with several Tier-1 transit providers at various sites across the UK. Internet access can be delivered to customer sites using various broadband and Ethernet circuit options as detailed above, and is available within all Redcentric data centres.

Redcentric is an Internet registry partner of RIPE (Réseaux IP Européens) and has devolved authority for allocated IP address space. Redcentric also run a Border Gateway Protocol (BGP) routing Autonomous System (AS). For outbound Internet browsing, Redcentric assumes clients connecting to the Internet will use Port Address Translation (PAT) to map internal private Internet addresses to a single public Internet address.

The Redcentric Internet service incorporates a secondary email server as a backup facility to the customer's own Simple Mail Transfer Protocol (SMTP) email server should it be required. If the customer's email server or network connection fails, incoming emails will be temporarily held on the Redcentric resilient secondary email server infrastructure. These stored mails will then be sent to the customer's email server once it is back online.

As part of the Internet service, Redcentric provides highly available, resilient Domain Name Service (DNS) infrastructure to resolve Internet Protocol (IP) addresses for outgoing web, email and other requests from users of the Internet service.

FIREWALL

Redcentric's managed firewall service is based on a hardware appliance or specialist firewall software running on a purpose built platform. The firewall controls traffic between devices on networks with different security levels. The firewall is configured to meet a customer's specific requirements. The managed firewall service is designed to offer passive defence, providing restrictions on the source and destination IP addresses, service ports and/or applications that are allowed to pass through the firewall. Redcentric monitors the firewall for hardware failure and staff manage the firewall configuration and provide advice on proposed configuration changes.

The function of any firewall is to filter traffic as it passes from one network to another, also called border protection, based upon pre-determined criteria. No firewall can protect against all protocol or application weaknesses, and new software vulnerabilities are discovered regularly. All devices protected by a firewall should be administered with the same level of diligence as if the firewall were not present.

FEATURE SUMMARY

- Single device or high availability firewall pairs are available.
- Choice of firewall vendor for multi-layer protection
- Firewalls can be deployed on a customer's site or within a Redcentric Data centre
- Support for site-to-site Virtual Private Networks (VPN)
- Support for remote client VPNs for home workers.
- Utilises Network Address Translation (NAT) to hide customer network addresses from the Internet (IPv4 only)
- Fully configurable rule-base managed by Redcentric's trained professionals.
- Customers receive advice and guidance on the effectiveness of the implemented rule-base, and any proposed changes.
- Application aware, Layer 7 model options available
- •Unified Threat Management (UTM) functionality options
- Multi-context hardware firewall options

Redcentric configures the firewall(s) with rules that meet the customer's operational requirements. Redcentric recommends that prior to implementing any firewall solution the customer undertakes a full security review. One component of this security review should be the creation of a network security policy. The security policy can form the basis of the firewall rule-base and UTM configuration that will be implemented on the firewall(s).

Redcentric deploys firewalls from various vendors including Cisco Systems, Fortinet and Palo Alto. Intrusion Detection and Prevention (IDS/IPS), Anti-virus, and Web filtering functionality is optionally available on certain models. Firewalls are available in various sizes, and with capabilities to meet the needs of customers wishing to enforce network boundary security at small office sites through to very large corporate head offices and hosting environments within data centres.

All subscription and licensing costs required to deliver basic and, when chosen, optional functionality are included in the charges for the managed firewall service.

Redcentric supports IP-Security (IP-sec) and Secure Socket Layer (SSL) VPNs to firewalls and routers and other devices where compatibility exists.

CONNECTIVITY

Redcentric also supports IP-sec and optionally client based SSL remote user VPNs. User authentication options include integration with corporate directory structures (e.g. Lightweight Directory Access Protocol – LDAP), external 2-factor authentication systems (available separately), and suitable third-party authentication servers using the Remote Access Dial-in User Service (RADIUS) protocol.

Redcentric polls managed firewalls regularly to check for availability and critical events (these include hardware failures, environmental alarms etc. where available). Service tickets are automatically generated on the Redcentric system when faults are detected. The tickets are managed by engineering professionals in Redcentric's operations centre

UTM OPTION

Anti-virus, content filtering and intrusion detection updates are periodically downloaded to the firewall automatically.

A single policy/profile for each of these services will be defined which can be tailored and applied to certain traffic as required. This single policy/profile is suffice for the majority of customers but Redcentric will create and administer additional policy/ profiles as required.

When the firewall detects that an AV or IDS signature has triggered, the customer will be notified so that they can investigate accordingly.

SECURE REMOTE ACCESS

Redcentric's Secure Remote Access service offers a robust, flexible and secure way for remote workers to access information and business applications whilst away from their usual work location. A piece of software on the user's PC (or tablet or other remote device) communicates with the Redcentric platform across a ubiquitous Internet connection and a secure tunnel is built between the two. The user's data is passed through this tunnel, then from the remote access platform to the customer environment hosting the application and/or data. The service includes highly secure two-factor authentication to ensure that only legitimate users can connect. Strong Encryption is implemented on the tunnel between the user and the platform to protect sensitive information in transit.

Remote Access Service supports organisations by:

- Enables Remote Working - Enables NAS's staff to access key resources remotely via any internet connection and suitably enabled device
- Supports Business Continuity – The service allows NAS's users to continue working away from their formally connected offices, enabling business continuity and recovery from unexpected or disastrous events that prevent them attending their official place of work
- Increased Front-end Focus – The service is managed by Redcentric hence allowing NAS's staff to concentrate on their core business activities
- Scalable and Flexible – The service delivers best-of-breed remote access connectivity and can scale easily to meet the needs of customers as they grow
- Access to Value-Adding Service Propositions – The service is designed to complement, support and enhance the entire Redcentric portfolio of cloud based services

SERVICE CONSTRAINTS

MAINTENANCE WINDOWS

Redcentric is committed to continually improving and expanding its core network and data centre capabilities, thus striving to provide the highest levels of service to its customers. In order to facilitate these improvements, it is necessary to carry out essential work from time to time. These activities are carefully scheduled through the use of an internal change control process which is designed to present maximum visibility of that change and thereby ensure that planning and implementation are carried out to minimize the effect on customers and their network services.

For the benefit of our customers Redcentric will allocate a pre-determined planned window which will be utilised to carry out any core infrastructure changes which may carry a minimal risk of disruption to service, or in some instances a period of service downtime which would be kept to an absolute minimum. In either instance, customers will be notified of the full details of the requirement with a minimum of 14 days' notice prior to the maintenance window. Generally Redcentric will endeavour to carry out any improvements in the reserved windows listed below; however unforeseen circumstances might dictate that improvements are carried out at other times. Not withstanding such notice Redcentric shall still provide the Services in accordance with the applicable Service Level.

Redcentric will endeavour to give customers as much notice as possible.

In very exceptional circumstances, there may be an emergency requirement to instigate work outside of these maintenance windows, however, every effort will be made to avoid disruption during core service hours and prior notification will be issued at the earliest possible opportunity.

There may be occasions when there is a requirement for an Emergency Change to be carried out (e.g. a hardware failure to a core network device which has caused loss of resilience). Emergency Change allows for Change to be fast tracked with <14 days customer notification. Emergency Change is only used in exceptional circumstances, where there will be a significant business impact should the change not be expedited. Emergency Change records are thoroughly reviewed by the Redcentric Change Advisory Board (CAB) to assure they were justified.

LEVEL OF CUSTOMISATION PERMITTED

- The service is deployed on customer dedicated Oracle Engineered Systems and is build bespoke to meet the customers' requirements.

SCHEDULE FOR DEPRECATION OF FUNCTIONALITY/FEATURES

Redcentric commit to providing services for the duration of the G-Cloud contract.

SOFTWARE UPDATES

Redcentric will monitor the product lifecycles of supporting platforms that deliver the service such as; Oracle Database, Oracle Exadata, Oracle Real Application Clusters. Critical patches, and patches required in response to published security alerts, will be applied as appropriate.

PRICING

SOLUTION PRICING

Service Element	Details	Charge
Datacentre build	Charge for build work within the datacentre to host the DBaaS platform	Charge specific to the quantity and type of equipment required
Platform accreditation	Charge for Redcentric to assure the environment to Official level	£15,000
DBaaS platform	Charge for procurement of Redcentric provided DBaaS platform	Charge specific to the quantity and type of equipment required
Network connectivity services	Charge for Redcentric to provide network connectivity into the DBaaS environments	Refer to separate Redcentric G-Cloud service definition
Network appliance service	Redcentric will design, build, install and test the network appliances	£1,500 Cisco ASA-5515X pair
£1,500 Juniper SRX-220 pair		
£1,500 Cisco ASA-5525X pair		
£1,500 Citrix NetScaler hardware pair		
£5,600 IDS on Cisco ASA		
For Citrix NetScaler software pair, included in the monthly service charge		
Managed desktop service	Charge for Redcentric to setup desktop environment	Refer to separate Redcentric G-Cloud service definition
Shared IaaS	Redcentric will provide the customer with access to the IaaS platform to provision virtual machines	Refer to separate Redcentric G-Cloud service definition
Dedicated IaaS	Redcentric will design, build, install and test the customer dedicated platform. The hypervisor hosts quantity and configuration will be agreed with the customer	Refer to separate Redcentric G-Cloud service definition
Managed backup service	Redcentric will install the agent software and plug-ins on all source servers, provide training for customer admin staff and enable the off-siting of backup data	£1,500 for service setup
Agent plugins included in the monthly service charge		
Software licensing (Oracle)	Charge for Redcentric to provide Oracle software licences	Charge specific to the quantity and configuration of DBaaS hosts deployed
Software licensing (Non-Oracle)	Redcentric will make the licence from its service provider agreements	Included in the monthly service charge
Professional Services	Redcentric to provide professional services to assist with the service activation and customer on-boarding	Refer to separate SFIA rate card

PRICING

STANDARD DELIVERABLES (NO ADDITIONAL CHARGES)

Redcentric provide inclusive professional services within the delivery of DBaaS, covering:

- Presales consultation for Redcentric services
- Completion of all supporting documentation (Schematics and schedules)
- Provision of services as per the supporting documentation

ADDITIONAL CHARGEABLE SERVICES

Redcentric provide additional chargeable professional services to cover:

- Oracle Consulting Services
- Live Service Team, including:
  - » Service Delivery Manager
  - » Operating System Engineer
  - » Oracle Database Administrator
- DBaaS & support platform service design
- Live Service design
- Excess engineer time (incurred through additional onsite works required, customer delays or lack of site readiness)
- Specialist disaster recovery / business continuity planning and implementation
- Business and technical strategy planning
- Out of business hours installations
- Failed appointments
- Follow up technical consultations such as redesign workshops
- Specialist post implementation design work – for example full migration planning, documentation and implementation

Service Element	Details	Charge
Professional Services	Technical Consultancy – Onsite – UK Only	£1,000 / day
	Technical Consultancy – Offsite	£750 / day
	Technical Consultancy –Onsite – UK Only (evening/night)	£1,500 / day
	Technical Consultancy - Offsite - (evening/night)	£1,000 / day
	Technical Consultancy – Offsite – Rest of World	£1,200 / day + expenses
	Technical Project Management – Onsite	£1,000 / day
	Technical Project Management – Offsite	£750 / day
Delivery & Installation	Engineer excess hours charges (per hour)	TBC / hour
	Engineer out of hours surcharge	TBC / hour
	Failed engineer appointment	TBC / visit

PRICING

ONGOING MONTHLY SERVICE CHARGE

The following table details the chargeable elements associated with the ongoing use of the DBaaS.

DBAAS MONTHLY SERVICE CHARGE

The following table details the chargeable elements associated with the ongoing use of the Database as a Service when deployed on Redcentric provided equipment.

Service Element	Details	Monthly Charge
DBaaS (Exadata)	Charge to provide DBaaS from a quarter rack Oracle Exadata (X5-2) Database Machine in either extreme flash or high capacity configuration Includes Oracle database Enterprise Edition licences. Based on database server specification of 256GB memory	£145,000
DBaaS (Exadata)	Charge for additional Oracle Exadata (X5-2) database server. Based on database server specification of 256GB memory Includes Oracle database Enterprise Edition licences	£45,000
DBaaS (Exadata)	Charge for additional Oracle Exadata (X5-2) high capacity storage server	£10,000
DBaaS (Exadata)	Charge for additional Oracle Exadata (X5-2) extreme flash storage server	£12,000
DBaaS (Exadata)	Charge to provide DBaaS from a quarter rack Oracle Exadata (X5-2) Database Machine in either extreme flash or high capacity configuration Provisioned with 60% database CPU turned off, leaving 28 licenced via capacity on demand Includes Oracle database Enterprise Edition licences. Based on database server specification of 256GB memory	£90,000
DBaaS (SuperCluster)	Charge to provide DBaaS from an Oracle SuperCluster (M6-32 or T5-8). Excludes Oracle database software licences	Pricing bespoke to the appliance configuration
DBaaS (DBA)	Charge to provide DBaaS from an Oracle Database Appliance (X5-2). Excludes Oracle database software licence.	Pricing bespoke to the appliance configuration
DBaaS (Commodity)	Charge to provide DBaaS from an X86 commodity platform. Excluded Oracle database software licences	Pricing bespoke to the X86 commodity platform configuration
Live Service Support	Charge for Redcentric to provide DBaaS live service support	Pricing bespoke to the appliance and customer environments
Platform accreditation	Charge for Redcentric to assure the environment to Official level	£15,000 per year

PRICING

Where the customer provides the DBaaS platform, be it Oracle Engineered System or commodity, the following charges will apply.

Service Element	Details	Monthly Charge
Hosting and Power	The cabinet 'foot-print' incurs a fixed monthly recurring charge. There is a minimum charge for per cabinet including electricity supply. The electrical current consumption is measured periodically throughout the month and the values stored. At the end of the month, the customer is billed for the minimum committed footprint. Should the current draw or the month's peak current consumption be higher than contracted Redcentric will advise the customer to reduce the draw immediately or alternatively increase the footprint by the equivalent excess draw per rack, i.e. should the customer subscribe to a 16Amp cabinet and uses an excess of 20 Amps then Redcentric will be entitled to charge the customer for two additional cabinets. The charge for power and hosting space may be varied by Redcentric once per year as per the terms and conditions. The charge may increase or decrease depending on the cost of electricity and other power related services purchased by Redcentric. Pricing assumes non-dedicated suite in a BIL0 environment. Private suites for BIL environments up to BIL4 are available upon request.	8Amp rack = £995 12Amp rack = £1,150 16Amp rack = £1,300 24Amp rack = £1,750 32Amp rack = £2,200
Oracle Support	Oracle ACS support of the customers Oracle Engineered System	Pricing bespoke to each appliance
Live Service Support	Charge for Redcentric to provide DBaaS live service support	Pricing bespoke to the appliance and customer environments

PRICING

DBAAS / OPTIONAL MONTHLY SERVICE CHARGES

Service Element	Details	Monthly Charge
Managed backup service	The per GB charge for data stored in the vault	£0.25
Software licensing	The charge per user, core or processor to provide a software licence	Charge specific to the licence provided
Network appliance service	The fixed charge for provision of the network appliance service.	£595.00 Cisco ASA-5515X pair £595.00 Cisco Juniper SRX-220 pair £1,095.00 Cisco ASA-5525X pair £995.00 Citrix NetScaler hardware pair £703.00 IDS on Cisco ASA £300.00 Citrix NetScaler VPX 10Mb std £600.00 Citrix NetScaler VPX 200Mb std £600.00 Citrix NetScaler VPX 10Mb ent £1,100.00 Citrix NetScaler VPX 200Mb ent
Network connectivity services	N/A	Refer to separate Redcentric G-Cloud service definition
Managed desktop service	N/A	Refer to separate Redcentric G-Cloud service definition
Software licences (Oracle)	Charge to provide Oracle software licences	Charge specific to the quantity and configuration of DBaaS hosts deployed
Software licence (Non Oracle)	Charge for Redcentric to provide non-Oracle software licences available from its service provider agreements	Charge specific to the quantity and configuration of DBaaS hosts deployed
IaaS Shared	N/A	Refer to separate Redcentric G-Cloud service definition
IaaS Dedicated)	N/A	Refer to separate Redcentric G-Cloud service definition

DISCOUNTS

Should the total monthly charge exceed £50,000 the discount available is 5%.

Should the total monthly charge exceed £100,000 the discount available is 10%.

EXAMPLE 1 – SMALL DEPLOYMENT

An Oracle Database Appliance deployed by Redcentric with capacity-on-demand used for 16 cores, supports:

- 2 Database servers
- 16 processing cores activated (or 72 available)
- 512GB database memory
- 32TB usable storage (double mirrored configuration)

EXAMPLE 2 – LARGE DEPLOYMENT

An Oracle SuperCluster T5-8 deployed in two IMS data centres with supporting Sun ZFS Storage Appliances and T5-2 Servers. This utilises customer provided Oracle Engineered Systems.

This is charged as:

- Hosting and power to support 4 racks per data centre with a 100 amp power draw per data centre
- Oracle ACS support for the Oracle Engineered Systems
- Network appliances to provide LAN, firewall, load balancing and intrusion/detection services

SERVICE LEVELS

Redcentric understand the importance of the services that our Customers are looking to contract for as defined within your requirements.

Redcentric already have SLA's and Penalties (service credits) as standard offerings for each of our managed services.

AVAILABILITY

IaaS shall be deemed available when the customer is able to access and use the customer's applications and services hosted by Redcentric. This may include periods where the customer is unable to access applications and services, where it is demonstrated by Redcentric to the customer's satisfaction, or where any inability to access the customer's applications and services is the result of permitted downtime.

Any reduced charges under this Service Level Agreement will be confirmed by credit note issued by Redcentric to our customers, confirming the adjustment to be made to the following monthly charge.

An overview of Redcentric's SLA's are detailed below:

Redcentric Service	Service element	% Service Level	Measurement Period
DBaaS	% Core system availability	99.99%	Calendar month
Shared IaaS	% Core system availability	99.99%	Calendar month
Dedicated IaaS	% Core system availability	99.99%	Calendar month
Managed backup service	% Managed backup server vault availability	99.0%	Calendar month
Network appliance services	% Appliance availability	99.99% load balancing 99.5% single firewall 100% dual firewalls in high availability	Calendar month
Network connectivity services	% Availability	Equal to the availability service level of the Redcentric access circuit or data centre port.	Calendar month
Managed desktop services	% Core system availability	99.0% single site 99.99% dual site	Calendar month

SERVICE LEVELS

SUPPORT HOURS

The Customer Service operation is available 24x7x365 and can be contacted by telephone, email or via the Customer Portal. Your call is routed directly to our Service Management Centre (SMC) who will log your Service Call, agree the call priority and assign a customer interaction number which will allow your request to be identified efficiently and tracked at all times.

SEVERITY DEFINITIONS

The following table defines examples of the priorities to be used by the Customer and Redcentric when logging calls. Redcentric shall respond to all requests for support in accordance with the table below.

Priority 4 (Low)	Typical Event
Classification: • Monitoring of an open Incident.	• Monitoring Phase if required for a previously categorized P1-P3 Incident (for example health-check/performance monitoring of a customer's CPE). • Not to be treated as Advice and Guidance as this should be an Interaction. Redcentric call handling process: Logged service calls will be progressed between the hours of 09:00 - 17:30 hrs until resolved.
Classification: Single user issue but not a VIP. • Call Logging: 24hr x 7 day x 365 days • Response: Within 1 business day	• Admin change of one users telephony account. Redcentric call handling process: Logged service calls will be progressed between the hours of 09:00 - 17:30 hrs until resolved.
Classification: Error or fault with the installed product or service but which has no critical effect. Operational but degraded product or service. Temporary work-around may be available • Call Logging: 24hr x 7 day x 365 days • Response: Within 4 Hours - 24x7x365	• Backup task/agent failure • Remote LAN/WAN circuit errors or IP packet loss • System performance degraded • Non specific fault or problem Redcentric call handling process: Logged service calls will be progressed 24x7x365 until resolved
Classification: Error or fault with the installed product or service, which is causing severe impact to Customer operations. Product or Service unusable. Major incidents. • Call Logging: 24hr x 7 day x 365 days • Response: Within 1 hour - 24x7x365	• Escalation of Priority 2 call • Complete failure/unavailability of backup service • Data Circuit failure • Customer unable to connect to Internet • Major problem with firewall • System Failure Redcentric call handling/escalation process: Logged service calls will be progressed • 24x7x365 until resolved Routine notification to Team Leader

"Typical events" are illustrative only and are not limited to the events listed.

SERVICE CREDITS

The Parties agree that the payment of Service Credits is a reduction in Charges for the receipt of a deficient Service and that Service Credits are the only remedy for failure to meet a Service Level. The Service Credits are calculated by reference to the Charges for the Service affected.

Availability and Performance Calculations

The availability Service Level is calculated at the end of each Measurement Period and is calculated as follows:

$$\text{Percentage Availability} = \frac{(MP-SU)x100}{MP}$$

Where:

MP = Measurement Period. This is the total number of minutes in the measurement period.

SU = Service Unavailability. This is the total number of minutes in the measurement period when the Service is not available for use by the Customer for reasons other than those set out below.

The following events shall be excluded from any assessment of Service unavailability:

Service unavailability due to the acts or omissions of the Customer or its employees, agents or subcontractors (excluding Redcentric).

SERVICE SPECIFIC DETAILS

Infrastructure as a Service

The Service availability measure will be the percentage of the period in the measurement period, that the core server hosting platform is available to operate the Customer's server(s).

Service availability measurement will be measured from when the fault is logged by the Customer or identified by Redcentric (whichever is earlier) to the time when the core server hosting platform becomes available for operational use.

Managed Backup Service

Service availability measurement will be measured from when the fault is logged by the Customer or identified by Redcentric (whichever is earlier) to the time when the MBS vault becomes available for operational use.

SERVICE CREDITS

SERVICE CREDITS

The service credit shall be calculated for each service as follows:

$$\text{Service Credit} = \frac{(C \times H)}{MH}$$

Where:

H = the number of full completed hour(s) in excess of service level.

C = total charges payable in respect of the service for the same month.

MH = the total number of hours in the same month.

Except for the following services:

Service	Service Credit Value
Managed backup service	5% of monthly Service Charge for 1 instance of MBS vault outside of SLA 10% of monthly Service Charge for 2 instances of MBS vault outside of SLA 20% of monthly Service Charge for 3 instances of MBS vault outside of SLA 30% of monthly Service Charge for 4 instances of MBS vault outside of SLA 40% of monthly Service Charge for 5 instances of MBS vault outside of SLA 50% of monthly Service Charge for 6 instances of MBS vault outside of SLA 60% of monthly Service Charge for 7 instances of MBS vault outside of SLA 70% of monthly Service Charge for 8 instances of MBS vault outside of SLA 80% of monthly Service Charge for 9 instances of MBS vault outside of SLA 90% of monthly Service Charge for 10 instances of MBS vault outside of SLA 100% of monthly Service Charge for 11 instances of MBS vault outside of SLA 100% of monthly Service Charge where any one instance exceeds 72 hours
Network appliance services – Firewalls	Single firewall: ≥99.5% = no service credit ≥99.0% but <99.5% = 5% of monthly service charge ≥97.0% but <99.0% = 15% of monthly service charge <97% = 20% of monthly service charge Dual firewall in high availability ≥100% = no service credit ≥99.0% but <100% = 5% of monthly service charge ≥97.0% but <99.0% = 15% of monthly service charge <97% = 20% of monthly service charge

SERVICE SUPPORT

Redcentric is a managed communications and IT company. We don't like to think of ourselves as selling you a product; we prefer to think of it as us becoming part of your telecom and IT team.

SERVICE SUPPORT

Redcentric will monitor and manage the service up to and including the database layer. Anything lower than this (e.g. applications and bespoke Authority software) is the responsibility of the Authority.

Redcentric's customer service operation is available 24/7/365 and can be contacted by telephone, email or via the customer portal. The customer call is routed directly to the Service Management Centre (SMC) who will log your service call, agree the call priority and assign a customer interaction number which will allow your request to be identified efficiently and tracked at all times. Our highly skilled engineers will then deal directly with the query.

Redcentric employs over 470 staff, 80% are customer facing. The skills within our support engineers have vary from server and storage specialists (EMC, NetApp and Isilon), to Microsoft and VMware specialist, to network and routing specialists (Cisco, Riverbed etc), data management and protection specialists (e.g. Symantec, IBM, i365, etc).

ALL SERVICES 24/7 MANAGED AND MONITORED

Within Redcentric's core infrastructure is a resilient monitoring and management platform. All core and managed customer equipment is polled and interrogated for performance and availability. If at any point a threshold for one of these parameters is breached, our browsers will automatically instigate the support process. The alerts that are generated are specific to device and interface availability along with CPU threshold. As well as communicating the fault to the customer, the interactions are available for viewing on Redcentric's InForm portal. Interactions will also be collated and reported in Monthly / Quarterly service reviews.

The entire Redcentric-owned infrastructure is monitored by tour industry leading browsers within Redcentric's' core. Each device is polled at five minute intervals. If a single poll is missed the browsers begin the automated process of generating alerts and the support process is instigated. An engineer will be tasked with verifying the fault is in existence and will progress accordingly. All hardware in the solution is owned, maintained and managed by Redcentric.

Where requested, customer equipment configurations are routinely backed up to a central location ready for remedial action of faulty hardware. Replacement hardware is built and taken to site by a Redcentric engineer.

Any alerts that are generated are passed directly to our frontline 24/7/365 team. This team is skilled in all aspects of Redcentric's portfolio to the extent that 70% off all tickets are handled through to completion by this team. Product specific tickets for services such as networks are escalated to our Networks Team. Again this team is available 24/7/365 and will progress any issues round the clock. Our 24/7/365 team are trained to know when to escalate to the appropriate teams once initial checks have been carried out. Redcentric operate a transparent support model and full details of the escalation path are provided to the customer with contact details.

SERVICE SUPPORT

PROBLEM MANAGEMENT

Redcentric's Problem management process is responsible for managing the lifecycle of all problems. The primary objectives are to prevent problems and resulting incidents from happening, to eliminate recurring incidents and to minimise the impact of incidents that cannot be prevented.

Problem management includes the activities required to diagnose the root cause of incidents and to determine the resolution to those problems, it is also responsible for ensuring that the resolution is implemented through the appropriate control procedures, especially change management and release management. Problem management will also maintain information about problems and the appropriate workarounds and resolutions, so that the organisation is able to reduce the number and impact of incidents over time. In this respect, problem management has a strong interface with knowledge management, and tools such as a known error database will be used for both.

Although incident and problem management are separate processes, they are closely related and will typically use the same tools and may use similar categorisation, impact and priority coding systems. This will ensure effective communication when dealing with related incidents and problems. Our Service Desk and 2nd line Support teams ensure that problem tickets are raised where required. Our 3rd line Specialist Teams ensure that they investigate problem tickets in a timely manner and liaise with suppliers where applicable. The Customer Services Director ensures that regular reviews of problem tickets are conducted.

- A problem ticket can be raised by anyone in the business but typically this would be by a member of the support organisation (Service Desk, 2nd or 3rd line support)
- The ticket is assigned to the relevant specialist team where the manager of the team will allocate according to the resources available at that time
- The specialist will then work on the problem to identify the root cause, determine and test the fix and subsequently raise a RFC (Request For Change)
- The change will then go through a defined change authorisation process before final CAB approval and customer notification (if required) – re: the change management policy
- The change will be scheduled; all relevant parties informed, training and documentation provided as required and finally implemented If successful, a Known Error Record (KER) will be created and stored in the known error database and the problem ticket together with related records will all be closed.

MINIMISING IMPACT DURING MAINTENANCE

Redcentric is committed to continually improving and expanding its core network and data centre capabilities, thus striving to provide the highest levels of service to its customers. In order to facilitate these improvements, it is necessary to carry out essential work from time to time. These activities are carefully scheduled through the use of an internal change control process which is designed to present maximum visibility of that change and thereby ensure that planning and implementation are carried out to minimize the effect on customers and their network services.

For the benefit of our customers, Redcentric will allocate a pre-determined planned window which will be utilised to carry out any core infrastructure changes which may carry a minimal risk of disruption to service, or in some instances a period of service downtime which would be kept to an absolute minimum. In either instance, customers will be notified of the full details of the requirement with a minimum of 14 days' notice prior to the maintenance window. Generally Redcentric will endeavour to carry out any improvements in the reserved windows listed below; however unforeseen circumstances might dictate that improvements are carried out at other times. Notwithstanding such notice Redcentric shall still provide the Services in accordance with the applicable Service Level.

Redcentric will endeavour to give our customers as much notice as possible.

In very exceptional circumstances, there may be an emergency requirement to instigate work outside of these maintenance windows; however, every effort will be made to avoid disruption during core service hours and prior notification will be issued at the earliest possible opportunity.

There may be occasions when there is a requirement for an Emergency Change to be carried out (e.g. a hardware failure to a core network device which has caused loss of resilience). Emergency Change allows for Change to be fast tracked with <14 days customer notification. Emergency Change is only used in exceptional circumstances, where there will be a significant business impact should the change not be expedited. Emergency Change records are thoroughly reviewed by the Redcentric Change Advisory Board (CAB) to assure they were justified.

SERVICE MANAGEMENT

Redcentric is a managed communications and IT company. We don't like to think of ourselves as selling you a product; we prefer to think of it as us becoming part of your telecoms and IT team. As such we pride ourselves on the service that we provide to our customers.

An aligned account management team will be provided from the outset, the account team consists of a Client Account Manager (CAM), and a Service Delivery Manager (SDM).

Specifically, Redcentric's account management team will:

- Be the Client Advocate – Redcentric's Account Management team is measured and rewarded against client satisfaction
- Provide an empowered point within Redcentric to which issues surrounding satisfaction of service may be escalated and resolved
- Offer assurances that Redcentric will be acting in their interest at all times
- Act as a Single Point of Contact – for all non-technical issues; working collaboratively at all times with the Client Account Manager to develop a thorough understanding of your business needs and growth. Through understanding our customer's goals and the technology that is used, we are able to give proactive recommendations that are customer/site specific and will facilitate and support growth
- Act as a Communication Channel – the Service Delivery Manager (SDM) will be the key point of contact for customers wishing to develop their critical applications or infrastructure. They are responsible for organising meetings and / or conference calls with developers, systems integrators and Redcentric staff to discuss performance and upgrades.
- Troubleshoot and provide Problem Resolution – although the Service Management Centre will provide immediate technical assistance for faults, the SDM will co-ordinate medium-term projects with the intention of resolving recurring problems should they arise.
- Provide Trusted Advice – the Redcentric Account Management Team becomes an extension and trusted advisor of the Client's IS/IT department and will foster additional business relationships with the client to achieve common goals.
- Take a Proactive Approach – the Redcentric Account Management Team will take a proactive approach to the Clients critical application or infrastructure environments.

To help integrate the Redcentric account team with our customers IT team we need to meet the individual team and understand their challenges, what works well and where we might be able to help. To gather all the details we need for the migration, we would setup regular meetings, which would also help build relationships.

As we have done with other public sector accounts, we also set up peer-to-peer meetings between support managers and team leaders, technical engineers, product managers and directors from both sides if possible. The aim is for both businesses to understand each other on as many levels as possible.

SERVICE MIGRATION

Redcentric's Project Managers are registered PRINCE2 Practitioners, having a wide and diverse portfolio of skills based on previous experience and the requirements for delivering Redcentric's services. The team has a combined wealth of experience, gained from a variety of I.T. industry sectors.

Redcentric will assign a dedicated Project Manager as a single point of contact for the delivery of all services to the Authority, who will engage with the relevant Authority staff at the earliest possible stage, to ensure full project lifecycle management. Additionally, there will be a minimum of 2 (PRINCE2 qualified) Project Support staff assigned to assist the Project Manager throughout the delivery, ensuring continuity of service. The Service Delivery department operates a clearly defined escalation hierarchy to ensure the prompt resolution of any concerns or queries.

Redcentric will operate a tailored and perhaps most importantly, flexible project management approach to the delivery, in line with the Authority's requirements and stipulations. We fully understand how critical it is for any organisation to have no service interruptions. The key element to any successful delivery or migration strategy is planning – our ethos is based on the adage: "if you fail to plan, you plan to fail". To this end, we encompass planning activities throughout the lifecycle of all deliveries and migrations.

Redcentric will work with the Authority to produce a low-risk migration strategy that meets the Authority's requirements, taking steps to mitigate any potential or actual risks and having contingency plans in place, agreed in advance with the Authority. We can provide advice based on experience, as to the benefits and risks associated with proposed strategies under consideration.

Redcentric will:

- Contribute to Project Initiation Documentation as and when desired;
- Agree and adopt a well-defined Communication Strategy and Communication Plan with the Authority at the earliest opportunity;
- Liaise with the Authority to ensure that a Project Kick-off Meeting is held at the earliest opportunity, between all resources involved, to discuss and agree roles and responsibilities, deliverables, timeframe, migration strategy and testing procedures;
- Hold regular planning Meetings/Calls (as defined by the Authority) throughout the lifecycle (frequency determined in agreement with the Authority), where the previous stage of work is reviewed and the next stage of work examined in detail;
- In addition to the above, a full Lessons Learned review will be held at the end of each defined stage of the migration, where these can be discussed and incorporated into the planning for future stages;
- Issue regular project updates (frequency determined in agreement with the Authority), in addition to regular Checkpoint and Highlight Reports as required by the Authority;
- Operate a full risk management approach, including the maintenance and issue of RAID logs;
- Ensure the Authority approval and signoff of migration plans and any associated documentation, e.g. Call-flow schematics, Dialling Plans, Number Porting requirements, Scopes of Work, Failover Testing Plans, Training Frameworks and Requirements, Circuit/Voice Testing Requirements etc.;
- Ensure that the services are delivered to meet the Authority's Acceptance Criteria at every stage of the delivery;
- Hold a full project Lessons Learned review when all services have been delivered/migrated and fully document these, to be issued to both parties with the aim of continual improvement.
- Will be happy to engage with the Authority in any Business Benefit Review discussions or meetings if desired.

SERVICE MIGRATION

THE TEAMS INVOLVED IN THE DELIVERY OF THE SERVICE WILL BE AS FOLLOWS:

Project Manager:

A single point of contact for the project ensuring that all work streams, tasks and communications are carried out in a timely manner, within the time frames agreed at the start of the project. The Project Manager defines the tasks required to meet the project deliverables and coordinates all the technical resources aligned to the project in order to successfully complete each element. The Project Manager manages the documentation of the project ensuring strict information is stored, protected and distributed effectively, as well as ensuring that ultimately each piece of work completed within the project is completed to the required standard. The Project Manager will also coordinate any equipment procurement required for the project. The project manager reports to the Project Board.

Project Support:

Providing assistance to the Project Manager with some of the low level tasks involved in planning, documenting and executing the project. Also provides cover for the Project Manager during any periods of planned leave or short-term unplanned absence. Project support report to the Project Manager.

Service Delivery Manager:

Throughout the project implementation our customer's assigned Service Delivery Manager will:

- Initiate any reporting matrix regarding each individual installed service
- Confirm all site/cost centre billing elements
- Confirm all customer portal access to all implementations
- Provide initial bandwidth availability/utilisation reports
- Provide access lists
- Initiate the customer'sportal access, change control permission
- Become the point of contact for our customers with regards to planned maintenance and incident alerts.

RESPONSIBILITIES

A full roles and responsibilities matrix will be defined and documented as part of the lice service/support design activities.

DBaaS Live Service Responsibilities Matrix

Component / Responsibility	Ownership & Support						
	Service Provider	Asset Owner	1st Line Support	2nd Line Support	3rd Line Support	4th Line Support (Vendor)	Op
IG Standards	Customer	Customer	Customer	Customer	Customer	Customer	
Application Monitoring Tooling	Customer	Customer	Customer	Customer	Customer	Customer	
Application(s)/ Reporting	Customer	Customer	Customer	Customer	Customer	Customer	
Application Support	Customer	Customer	Customer	Customer	Customer	Customer	
Application Software	Customer	Customer	Customer	Customer	Customer	Customer	
Application Database	Customer	Customer	Customer	Customer	Customer	Customer	
Oracle Software	Redcentric	Customer	Customer	Redcentric	Redcentric	Redcentric	
Platform Database - System DBA	Redcentric	Customer	Redcentric	Redcentric	Redcentric	Redcentric	
Systems Monitoring Tooling	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
Guest O/S	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
Hypervisor	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
Oracle Server Hardware	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
Network Appliances	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
Network	Redcentric	Redcentric	Customer	Redcentric	Redcentric	Redcentric	
	* Manages the delivery of service against SLAs.	* Owns the physical asset, software, code or licenses. May be Redcentric or the Customer. * Planning and driving forward technology refreshes (moving from one technology to another).	* Handles initial contact from end users. * Calls may be passed to resolver groups outside of DBaaS. * Incidents may be raised directly to Redcentric via automated alerts/systems monitoring.	* Handles escalations from 1st/2nd Line Support. * Provides 24/7 Operational Support for Infrastructure. * Provides 'Business Hours' support for the application stack. * Undertakes "Regular Tasks". * Acts on alerts.	* Handles escalations from 2nd Line Support. * Tackles more complex issues and root cause analysis. * May undertake "Ad-hoc Tasks".	* Vendor based support. * Platinum Oracle support will be provided by Oracle to Redcentric. Contract held by Customer.	

Application

Infrastructure

Systems Management Tooling
Monitoring
Intrusion Detection
Automated Build
Software Distribution
Patching
Remote Control
AV
Privileged Access Control
Auditing

RESPONSIBILITIES:

perational Tasks – Cost Inclusive

Execute Backups	Monitoring	Execute Security Patching	Execute Functional Patching (Deployment)	Housekeeping Tasks	Inventory	Licence Compliance	Capacity Planning	Environment Management	Incident Fixes & Maintenance
Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer
Redcentric	Customer	Customer	Customer	Customer	N/A	Customer	Customer	Customer	Customer
Redcentric	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer
Redcentric	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer
Redcentric	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer
Redcentric	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Customer
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Customer	Customer	Redcentric	Redcentric	Redcentric
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Customer	Customer	Redcentric	Redcentric	Redcentric
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
N/A	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
N/A	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric	Redcentric
* Taking backups etc. in-line with solution design and service description. * Customer will provide the backup software.	* Customer will provide details of SLAs/OLAs. * Provider defines alerts & thresholds. * 24/7 monitoring of alerts and follow-on actions. * Involves liaising with appropriate resolver group(s).	* Review of published security patches against agreed policy. * Application of appropriate security patches.	* Review of published functional patches & bug fixes against agreed policy. * Application of appropriate patches / bug fixes / problem fixes.	* Definition and maintenance of housekeeping routines necessary for the efficient operation of the system. Includes archiving of logs. * Execution of housekeeping tasks as appropriate.	* Maintenance of a (near real-time) inventory of hardware & software assets. * Provision of *on-demand* inventory reporting service to Customer.	* Ensuring that all software is correctly and fully licensed. * Optimising the licensing within the boundaries of the contract. * Provision of *on-demand* license compliance / usage reporting service to Customer.	* Ensuring that plans are in-place to meet predicted growth of the service. * Provision of an *on-demand* capacity planning / usage reporting.	* Scheduling and approval of application of software distributions / patches / reboots.	* Responsibility for fixing 'broken' hardware or software.

TECHNICAL REQUIREMENTS

SERVICE DEPENDENCIES

Redcentric will utilise additional complementary chargeable services to support the database service, such as network connectivity.

- Connectivity – Redcentric's network services and/or the Internet are required to access DBaaS.
- Data Management – Redcentric provides managed storage, backup and archiving services.
- Security – Redcentric's Managed Firewall Service provides protection for traffic traversing network boundaries with different trust levels

DETAILED TECHNICAL INTERFACES

Access is specific to the customer application tooling involved.

ADDITIONAL INFORMATION

TRAINING

N/A

ORDERING AND INVOICING PROCESS;

Payment will be made by bank transfer (BACS) to the Redcentric's account as specified on the invoice. Redcentric's standard payment terms are 30 days from the date of the invoice received.

TERMINATION TERMS:

Redcentric will provide assistance where possible to facilitate a transition to any replacement service.

Redcentric will not be obliged to disclose any confidential information to the customer or replacement supplier, or to transfer any assets, contracts, employees or third party licences.

Redcentric will provide an inventory of all data relating to the services that is under the control of the Redcentric and details of the data structures in which the Customer Data is stored.

Redcentric will transfer all the customer data relating to the services to the customer.

Note that there are no additional charges for storing patient data other than the service charges listed. If, at the end of the contract, the customer decides that Redcentric will continue to store data for archiving purposes instead of being transferred to the customer, this will be covered in a subsequent Service Agreement and the commercials will be agreed at the time of that Service Agreement.

At the end of the contract with the customer and if the customer does not wish to renew their service.

Redcentric will assist the Customer in facilitating the orderly transition of the Redcentric Services (in whole or part) from Redcentric to the Customer or any replacement supplier upon the expiry or earlier termination of the agreement. This section sets out the principles regarding the service transition that form the base of an Exit Plan.

Redcentric shall produce an Exit Plan upon notification of termination of the agreement, in accordance with the principles set out in this section, as soon as practicable (but not later than 60 days) after any notice of termination of the agreement.

DETAILS OF ANY TRIAL SERVICE AVAILABLE.

Redcentric do not provide trials of the service.

EXIT PLAN

The Exit Plan shall, unless otherwise agreed with the Customer:

- address each of the issues set out in this Exit Plan in order to assist the Customer in facilitating the transition of the Redcentric Services from Redcentric to a replacement supplier, or the Customer ensuring to the extent reasonably possible that there is no disruption in the supply of Services and that there is no deterioration in the quality of delivery of the Services during any period of transitional assistance;
- provide an estimate of the scope of transitional assistance that may be required by the Customer and suggest how such assistance might be provided (if required); and
- provide an estimate of Redcentric's personnel that may be required to provide transitional assistance and suggest the management structure to be put in place and employed to provide such transitional assistance.

AGREEMENT TERMINATION

On termination or expiry of the Service Agreement, the Customer must undertake the following responsibilities:

- agree a time and date for the Redcentric owned equipment to be removed; and then
- remove the Customer's equipment at the agreed time on the agreed date in a sequence to be specified by the Customer

ADDITIONAL INFORMATION

ADDITIONAL TRANSITION ASSISTANCE

Where the Customer requests the provision of additional transitional assistance, in addition to that required under this section, Redcentric shall provide such assistance as an additional service. The additional transitional assistance detailed here shall be chargeable at the Redcentric prevailing time and materials consultancy day rates.

The transitional assistance shall, at the Customer's option, include any one or more of the following, but in each case only in relation to assets which are the subject of the Redcentric Services:

- notifying the Customer or replacement supplier of procedures to be followed and providing management to ensure these procedures are followed in relation to the transfer of the Redcentric Services;
- providing assistance and expertise as reasonably necessary to identify all material operational and business processes (including all supporting documentation) used by it or the Customer or replacement supplier in the provision of the transferring Redcentric Services;
- documenting the current status of work in progress and transferring such work in progress, including any partly completed developments and any partly completed Service Agreement changes to the Customer or any replacement supplier;
- to the extent that Redcentric is reasonably able to do so, providing assistance and expertise as reasonably necessary for examining all relevant roles and responsibilities in place for the provision of the Redcentric Services and the transitional assistance;
- providing information within Redcentric's possession about capacity and performance requirements;
- providing reasonable assistance to the Customer in procuring and receiving replacement services;
- co-operating in the execution of the plan for the migration of the Customer data (if any) compiled or used in the performance of the Services to the Customer or the replacement supplier providing skills and expertise of a suitable standard;
- assisting the Customer and the replacement supplier in the execution of a parallel operation involving the provision of the Redcentric Services (in whole or part) at the same time as the replacement services;
- the provision of all reasonable assistance required by the Customer to ensure the smooth transfer of the Redcentric Services to the Customer or the replacement supplier;
- providing any technical advice as may be reasonably required by the replacement supplier or the Customer to facilitate the provision of the replacement services to commensurate service levels and standards to those required by this Service Agreement;
- answering all reasonable questions including requests for technical advice from the Customer or its replacement supplier regarding the general nature of the Services.

COMPANY PROFILE

Redcentric is one of the UK's leading managed services provider, with a pioneering pedigree that goes back to the earliest days of business Internet and IP networking. We have built on that heritage and developed our capabilities to allow us to be a strong strategic partner for those organisations embracing IT as an enabler. We are here to support them, whether that be with traditional infrastructure or making the move and taking advantage of what the Cloud and hybrid environments have to offer.

Today we can offer a rich end-to-end solution portfolio covering the full spectrum of networks, data, voice, mobile, and applications, designed and delivered by our own highly skilled teams from our privately owned, UK based multi-million pound infrastructure.

Our ethos is one of collaboration, our aim is transformation, helping clients secure desired outcomes, substantive gains and a measured route forward for the future.

Our assurance comes from a long track record across both the private and public sectors, characterised by deep domain expertise, continuous innovation, proactive management and an enduring commitment to business improvement through better IT. We'd like to think that there are hundreds of organisations out there where Redcentric has already made a significant and lasting difference.

DIFFERENTIATORS

- **Outcomes focused** We don't define ourselves by the services we offer but the outcomes we secure for clients. Every project starts with the end-game, what you want to achieve, and we work back from there to design and deliver solutions that are best geared to meeting your various objectives: cost savings and cost certainty; greater productivity and reliability; enhanced security and resilience; increased agility and responsiveness; and improved potential for innovation and competitiveness, all while providing support and flexibility throughout the term of any contract and easy exit strategies to ensure working with Redcentric from start to finish is simple.
- **Multi-service, multi-site** IT now embraces many disciplines and the cost-effective, streamlined delivery of a complex web of technologies is only compounded by the disparate physical estates of many of today's organisations. Our great strength is our ability to be a unifying force: a single, centralised provider of multiple services across multiple sites, a partner who can manage a full range of IT needs however diverse and challenging.
- **Managed journey** We are not about the provision of one-off IT commodities but rather helping clients over the short, medium and long-term through the strategic alignment of our services to organisational requirements. Managed and Cloud-based (with) services, on and off premise solutions, there's a rich potential roadmap for clients and we can guide you on your journey at whatever speed and in whatever direction the need dictates.
- **Core service infrastructure** We believe that service quality is dependent on end-to-end control and capability, which is why we've spent the past three decades building our own infrastructure and skills base: a UK-wide MPLS network, Tier-3 standard UK data centres, a large ITIL-based support operation, and staff whose average tenure is 10+ years. Such solidity and dependability at our core translates into consistent, high-grade delivery of services and support day in, day out.
- **Accredited working** We have poured a huge amount of time, money and resource to develop best-in-class systems, processes and people that in turn allow us to attain the highest standards of certification and accreditation. These are not badges of honour, but hard-earned evidence of our commitment to quality, security and integrity, and our efforts to gain trust.
- **At the leading-edge** We are always reviewing our proposition, introducing new proven technologies that dovetail with our existing offering; and bringing these opportunities for further gains to clients as an intrinsic part of contract and relationship evaluation. But this spirit of innovation goes beyond bits and bytes, it is embedded in the very fabric of Redcentric as a service organisation. You may see it equally in a unique supply arrangement or a pragmatic project execution, the common factor being a willingness to think and do differently, to go beyond norms and conventions if that's what it takes.
- **Organisational health** As an organisation we are committed to investing the most that we can to build a sustainable, successful business that can deliver genuine IT outcomes for clients. We are continually refreshing our core systems or; adding capacity and capability, to the tune of many millions but ensuring this is without penalty to clients. We also invest in our staff and work hard to develop and preserve a culture that prioritises staff satisfaction and motivation. We believe the happier, more engaged and dynamic we are as a service provider the more we can achieve together and ultimately the better service we can provide to clients.

- 7 locations throughout the UK
- Multiple wholly owned UK data centres
- Upwards of 40,000 IP voice and SIP Trunk users
- Managing tens of thousands of network connections
- Accredited to connect and supply over Janet
- ISO 9001 & 27001 certified 22301
- Serving over 2000 customers across the UK
- ITIL Compliance
- Authorised to process HM Government data marked 'Official-Sensitive'
- HSCIC approved N3 aggregator
- Accredited to store patient data
- 13 years of N3 experience
- Experienced and successful G-Cloud approved supplier

COMPANY PROFILE

COMPANY STRUCTURE

Harrogate – Head Office and Data Centre
Central House
Beckwith Knowle
Harrogate HG3 1UG

London – Office
John Stow House
18 Bevis Marks
London EC3A 7JB

London – Data Centre
Lifeline House
80 Clifton Street
London EC2A 4HB

Reading – Data Centre
3-5 Worton Drive
Reading
Berkshire RG2 0TG

Theale – Support Centre
2 Commerce Park
Brunel Road
Theale, Reading
Berkshire RG7 4AB

Cambridge – Office and Data Centre
Newton House
Cambridge Business Park
Cowley Road
Cambridge CB4 0WZ

Hyde – Support Centre
Unit B, SK14 Industrial Park
Broadway
Hyde SK14 4QF

COMPANY PROFILE

CERTIFICATIONS

Redcentric can point to a long list of ISO and HM Government accreditations that underscore the standards and protections we put in place when we are entrusted with clients key IT assets.

- **ISO 9001** is the internationally recognised standard for an organisation's Quality Management. The term 'quality' refers to all those features of a product or service which are required by the customer. An organisation's 'Quality Management' refers to an organisation's actions to ensure that its products or services satisfy its customers' quality requirements and complies with any regulations applicable to those products or services. At Redcentric we continuously monitor, report and review the quality of service across all services, including physical infrastructure, network infrastructure, hardware and software used, operational and business processes to ensure we maintain a high quality of service. Throughout the lifecycle of any managed services contracts we continuously review and upgrade all service elements where required and applicable, to ensure ongoing service improvements.

- **ISO 27001** is the internationally recognised standard for an organisation's Information Security Management System (ISMS) and the objective of the standard is to provide a model for establishing, implementing, operating, monitoring, reviewing, maintaining and improving this ISMS, using a continual improvement approach. Redcentric aims to be recognised as an organisation adhering to the highest level of Information Security and therefore have an externally certificated ISMS that complies with the recognised industry standard for information security. ISO 27001 certification gives our customers and associates the confidence that Redcentric can be a trusted business to the public, as well as an information security assured supplier of managed services.

- **ISO 22301**

- **PCI DSS** is the Payment Card Industry Data Security Standard and is a worldwide information security standard assembled by the Payment Card Industry Security Standards Council (PCI SSC). The standard was created to assist payment card industry organisations which process card payments, to prevent credit card fraud via enhanced data security controls. The standard applies to all organisations that hold, process or exchange cardholder information.

The below formal certifications demonstrate the capability and alignment with Information Assurance requirements as mandated by the Public Sector.

- Authorisation to process HM Government data protectively marked 'Official-Sensitive'

- Authorised to transmit, process and store Person Identifiable Data (PID)

- Health and Social Care Information Centre (HSCIC) accreditation – "N3 ISP" (Network Access Agreement 0740)

- HSCIC IGSoC-compliant commercial third party (NACS code: 8GY91)

- HSCIC accredited and compliant data centre hosting facilities, including for Clinical Systems environments (Reference: YGMAP)

- HSCIC approved N3 Application Provider (YGMAY)

- HSCIC-accredited N3 Service Provider (Network Access Agreement Number: 0740)

- Accreditation to connect to and supply services over Janet into all connected institutions and organisations

- Formally transition and certify our Cloud services from BIL to meet the new Government security classifications

- Become a formal PSN (Public Services Network) certified service provider / supplier

- Become a HSCN certified service provider

HISTORY

Redcentric was incorporated on 11th February 2013. The business of the Redcentric Group is made up of the demerged Managed Services components of the Redstone Group, as enhanced by the acquisition of Maxima in November 2012. The acquisition of Maxima augmented the network assets owned by Redstone, including its connectivity, Cloud and hosting capabilities with a well-regarded mid-market business specialising in ICT managed services, managed security, unified communications and Cloud services. Further to this, the acquisition provided the Redcentric Group with an enhanced onshore and offshore 24 hour/365 day support function to underpin its service level agreements.

On 6th December 2013 Redcentric acquired InTechnology Managed Services limited. The integration of the two companies was completed on 1st July 2014 and InTechnology Managed Services Limited officially changed its name to Redcentric Solutions Limited.

Further to this, on 13th April 2015, Redcentric Group announced that it acquired Calyx Managed Services Limited.

The combined businesses, operating under Redcentric Solutions Limited, enjoy a scale that has enhanced their presence in the marketplace and provided an enlarged customer base to cross-sell a broad suite of well-regarded and supported services.

REDCENTRIC EXPERIENCE

As a final thought after reading our document, Redcentric would like to provide you with the assurance that we are not new players to the public sector; although our brand is not as big as some of our competition, this has not stopped us being able to compete, and subsequently deliver, some high profile services to the public sector. These services include but not limited to the following:

CONTRACT WIN WITH LEGAL AID AGENCY – 20 AUGUST 2015

Legal Aid Agency

Redcentric will provide a consolidated, flexible application development & test platform, facilitating the re-hosting of multiple current LAA environments through the provision of an Oracle Engineered Systems SuperCluster-based Platform-as-a-Service (PaaS), delivered from a high security level Redcentric data centre. The deal is designed to substantially improve the LAA's operational efficiency and facilitate agile delivery of LAA's core systems. Procured through G-Cloud, the contract will incorporate integrated provision of expert Oracle Agile Implementation Services and Advanced Customer Support.

CONTRACT WIN WITH HSCIC – 29 JUNE 2015

hscic Health & Social Care Information Centre

Through a two year contract Redcentric will provide Database as a Service (DBaaS) devised to support a national infrastructure programme. DBaaS will power a repository for healthcare data in England enabling a range of reporting and analysis to support the NHS in the delivery of healthcare services. Delivered by Redcentric's team of database experts, the managed service is a proven model for delivering high availability cloud database environments and will support HSCIC's critical repository. DBaaS, procured via the G-Cloud framework, will be provided from Redcentric's England based secure and accredited data centres, delivering a highly scalable and high performance system.

REDCENTRIC WIRELESS NETWORK LANDS AT MOD ON TIME AND UNDER BUDGET – 20 MARCH 2015

serco Defence Academy of the United Kingdom

The project provides a new high-speed wireless LAN at the Academy in Wiltshire, which trains personnel from the British Armed Forces, MOD Civil Service and other national and international government departments, with the aim of improving technology-based learning across its 250-acre site of around 170 buildings. Within a tight 12 week timeframe and 7% under budget, Redcentric installed in excess of 500 wireless access points and 25 kilometres of optical fibre on the Academy site. The project was managed within the constraints of operating within a working educational establishment and its busy timetable. State-of-the-art Wi-Fi performance was essential for the roll-out of the Academy's Technology Enhanced Learning (TEL) strategy and the improvement of the overall online experience for both staff and students. In order to provide the coverage required, Wi-Fi needed to be installed in over 50 of the buildings of the site. Their diverse nature – from a Grade 2 listed country house, to 1930s brick properties, to modern steel frame structures needed to be factored into Redcentric's approach, both in terms of installing equipment and obtaining the best possible coverage.

NHS CONTRACT WIN – 05 JUNE 2014

hscic Health & Social Care Information Centre

The two year contract is to provide a unique solution engineered for application performance, providing fast processing and quicker application deployment, making its big data more manageable. The contract was procured through G-Cloud and is in addition to an earlier agreement with the same partner announced on 24 February 2014. Redcentric will also deliver a range of services including networking services and hosted / virtual desktop infrastructure (VDI).

HARROGATE (HEAD OFFICE)

Central House
Beckwith Knowle
Harrogate HG3 1UG

THEALE

2 Commerce Park
Brunel Road
Theale
Reading RG7 4AB

CAMBRIDGE

Newton House
Cambridge Business Park
Cowley Road
Cambridge CB4 0WZ

READING

3-5 Worton Drive
Reading
RG2 0TG

LONDON OFFICE

John Stow House
18 Bevis Marks
London EC3A 7JB

LONDON DATA CENTRE

Lifeline House
80 Clifton Street
London
EC2A 4HB

HYDE

Unit B, SK14 Industrial Park
Broadway
Hyde
SK14 4QF

INDIA

405-408 & 410-412
Block II, 4th Floor, White House
Kundan Bagh, Begumpet
Hyderabad 500016

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redcentric
business technology. managed.

bsi.
ISO 9001 Quality Management FS603185
ISO 22301 Business Continuity Management BCMS603194
ISO/IEC 27001 Information Security Management IS603187