CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

1. Introduction

The IT Architecture section serves three purposes:

Section A: of this document provides prospective vendors with technical information regarding the City's current (but not limited to) IT environment. This subsection also provides the City's compulsory Architectural standards for the proposed solution.

2. Section A: General Architectural Standards

2.1 Current City of Cape Town's Information Technology Environment

Three of the largest technology decisions taken by the City of Cape Town are as follows:

a) SAP for structural business processes which covers the City's back-office systems.
b) Microsoft for unstructured business processes which covers the standardisation of the desktops and backend servers on Microsoft technology
c) Finally, Esri for Spatial which covers the implementation of ArcGIS Enterprise Environment desktop and backend servers.

Given that substantial investments (financial and human) have been made in these three technology "stacks", all new initiatives or developments needs to be in line with these technologies.

The table below contains all CCT landscape that supports our core and unstructured business processes. The versions specified should be regarded as the lowest version listed and could be higher as newer versions are released and implemented.

Domain	Software Vendor	CCT Current Standards (Minimum)
Operating System	Microsoft Server	Ms Windows Server 2012 R2
	SAP	IBM AIX 7.2 (minimum standard)
		SUSE Linux Enterprise Server 11.4 (minimum standard)
	ArcGIS	ArcGIS version 10.2.1, 10.3.1, 10.4.1, 10.6.1 (minimum standard)
Database	Microsoft	MS SQL 2014 (minimum standard)
	SAP	Oracle 12.1 as the minimum standard
		SAP HANA 2.0 SP03 (minimum standard)
	ArcGIS	ArcGIS version 10.2.1, future 10.6.1
Hardware Server Virtual Machines (Non - SAP Applications and Databases are hosted in the Virtual	Microsoft	Microsoft Hyper -V
	SAP	IBM Power Series 8 Virtual Machine
	ArcGIS	ArcGIS version 10.2.1, 10.3.1, 10.4.1, 10.6.1
Server Management	Microsoft	System Centre Suite 2016 (Configuration Manager, Operations Manager, Endpoint Protection and Virtual Machine Manager)
	SAP	SAP Solution Manager 7.2
	ArcGIS	Internal facing applications and solution for version 10.x EPIC ring fenced systems for version 10.x

		External facing applications and solutions for versions 10.x
Security and Business Continuity	**Microsoft**	**Data Protection Veritas NetBackup 8.0**
	SAP	**See authorisation Section below**
	ArcGIS Server	**ArcGIS version 10.2.1, 10.3.1, 10.4.1, 10.6.1**
Authorisation & Authentication	**Microsoft**	**Microsoft Active Directory Services (Windows Server 2012 R2)**
	SAP	**SAP ABAP NetWeaver Authorisation** **SAP Business Objects Authentication** **SAP HANA Enterprise Authentication & Authorisation** **SAP Cloud Identity Authentication & Authorisation**
	ArcGIS Portal	**Named User Authentication 10.x**
Portal/Web Hosting	**Microsoft**	**Windows 2012 R2 Server Running IIS 7.5.7600 as the minimum standard**
	SAP	**SAP Java NetWeaver Portal** **SAP ABAP NetWeaver Internet Communication Framework (Rest, ODATA, SOAP)** **HTTP Server – latest secure version (eg. 2.4.X or 2.5.X etc) in the series that is available as the minimum standard**

		Tomcat - latest secure version (eg. 8.5.X or 9.0.X etc) in the series that is available as the minimum standard
	ArcGIS	**ArcGIS Portal Version 10.4.1, 10.6.1**
Program Development	**Microsoft**	**.NET 4.5.2 (minimum standard)**
	SAP	**SAP ABAP NetWeaver 7.4** **SAP HANA 2.0 Enterprise Platform** **SAP Business Objects 4.n**
	ArcGIS	**JavaScript, ArcObjects & .NET 4.7.1**
Middleware/ Integration	**Microsoft**	**ASP.NET, MVV Web API, WCF Web Services, WDSL Web Services Description Language and REST**
	SAP	**SAP Process Integration 7.4 (minimum standard)** **GEO.e – Integration of Transport assets with SAP PM and FI**
	ArcGIS	**Esri Mediator – Integration of PVC objects wit SAP LUM**

Front End Services & Endpoint computing	**Microsoft**	**Windows 7 64-bit Enterprise and Windows 10 64 bit Professional (majority and Enterprise as the minimum standard** **Office Professional Plus 2010 as the minimum standard {Word, Excel, PowerPoint, Outlook, OneNote, InfoPath reader (electronic forms client), Lync (corporate instant-messaging client), SharePoint Workspace}** **Internet Explorer 11 as the minimum standard** **Exchange 2013 (Email)** **Skype for Business 2016 - Instant Messaging, Video Conferencing (minimum standard)** **SharePoint 2016 (minimum standard)**
	SAP	**SAP GUI 7.50 (minimum standard)**
	ArcGIS	**ArcMap 10.6.1 Suite** **ArcGIS Pro 1.2**
Supported File transfer Protocols	**Secure File Transfer Solution (SFTP), FTPS**	
Anti-virus software	**Trend Micro Smart Protection Complete Suite as the minimum standard**	
Records Management	**Public Sector Records Management SAP NetWeaver 7.4**	

Mobile field devices	**Android 4.4.4 operating system (minimum standard)**
	SAP Afaria 7 mobile management system (minimum standard)

Open Source	**Operating System**	**Redhat Enterprise Linux (RHEL) 7.5** **SUSE Linux Enterprise Server 12 SP4**
	Database	**MariaDB 10 (minimum)**
	Web hosting	**Apache 2.4 (minimum)** **Tomcat 8.5 (minimum)**
	Virtualisation	**Oracle Virtualbox 5 (minimum)**
Cyber Security, Fixed Networks Security	**Firewalls**	**Palo Altos**
	Proxy	**Citrix**

Network Minimum Standards

- The City's network is spread over a wide geographical area which runs on a MPLS network.
- Desktops typically have a 100Mbps LAN connection, while WAN connections vary between 28.8Kbps to 1Gbps (a typical WAN connection is 64Kbps)
- Servers in the datacentres are linked to a minimum of 1 Gbps of connectivity

Desktop Hardware Minimum Standards

The City of Cape Town's minimum desktop hardware specification are:

- Processor: Intel® Core™ i5-4590
- Memory: 4GB
- Chip Set: Q87 (Latest Intel AMT 9.0 with full Intel® vPro™ manageability)
- Windows operating system: Windows 7 Enterprise Edition and Windows 10 Professional Edition
- Hard Drive: 320GB HDD
- Graphics: Intel HD 4600
- Memory Slots: 2

Further Compulsory Standards

The following minimum IS&T Architectural Standards MUST be complied with:

1. IP protocol only on the network
2. The use of Secure Transport Layer Security (TLS) version 1.2 between all application components
3. Encryption of all data in transit which has been classified as confidential, sensitive and personal identifiable information.
4. Separate database and application server architecture.
5. ODBC or OLEDB connections between applications and databases
6. Full relational database design, using stored procedures.
7. All DLLs must be wrapped as COM+ objects (preferably written in .NET)

8. Minimum .Net Framework to be used version 4.7.1 in order to fully support TLS version 1.2
9. Scheduled events via DTS on SQL Server.
10. Application security (i.e. user accounts) at the application or database level (not at the OS level)
11. Applications and Databases hosted on Virtual Machine (VM) Servers created using MS Hyper-V (only)
12. Solution must function within a Microsoft Managed Environment
13. PC thick clients must not function requiring administrative rights
14. PC Thick clients must be packable and deployable across a network using System Centre Configuration Manager (SCCM) to locked down managed pc's
15. Solution interfaces with SAP must be SAP architectural compliant (preferably certified)
16. All confidential data must be encrypted and comply with POPIA/GDPR standards where required.
17. No direct connections to the internet will be permitted - in the case where a web application needs access to the internet it will only be permitted via an HTTP proxy
18. Outbound internet connections allowed via **proxy only** on HTTPS on port 443
19. Webserver Software (Tomcat/Apache etc) must have all vendor provided security patches to known CVEs applied.
20. All open source components/dependencies used by applications must comply will all/if any licensing requirements.
21. Industry IT governance and best practises must be adhered to i.e. COBIT, Microsoft Technet etc.
22. The City's IS&T password management policy be adhered to where applicable.
23. The City's IS&T Network Access policy be adhered to where applicable.
24. Ensure that industry best practises are followed regards to general Change and/or User Management processes.
25. Only the Open components of the Java Platform SE/EE must be used eg OpenJDK

Further Preferred Standards

The following IS&T ARCHITECTURAL standards are preferred:

1. Application Solutions hosted on Microsoft Platforms
2. Web applications rather than thick client/server applications
3. If thick client applications are used, these needs to be packaged in the Microsoft Installer format (MSI)
4. Application architecture to be modular, and N-tiered
5. Version control to be used for all application layers, and release management to include detailed release notes
6. The ability to co-exist with other 3rd party applications on the same hardware.
7. Application solutions not hosted on Microsoft platforms but on platforms such as Linux will be reviewed and considered based on the proposal put forward and as it complies with the requirements above
8. Hardware, Application, Data, Web services and any form of license verification and authentication must be hosted and conducted On Premises

Further Non-Supported Standards

The following IS&T ARCHITECTURAL standards are EXPLICITLY NOT SUPPORTED:

1. Active X Controls – the managed desktop environment does not permit these.
2. Mapped Network Drives or UNC paths between workstations and application servers
3. Mapped Network Drives between application/web/database servers
4. Mapped Network Drives or UNC paths between workstations
5. IP addressing - use DNS addressing instead
6. Application and database on the same server
7. Microsoft Access developed applications local or on a server
8. Applications written in such a manner whereby usernames and password are embedded in the application code
9. Thin client solutions such RDS and Terminal Servicer.