

# DETAIL THAT MATTERS:

## LOGIX COMPUTING AND DATA SECURITY

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**A**lthough historically SA Stud Book and Animal Improvement Association was originally only involved with the recording of pedigrees and registration of stud animals, the Association has evolved into the biggest, most reliable IT and database management institution in South Africa in dealing with registered stud breeders and keepers of animals, as well as associations and all disciplines involved with animals and animal activities.

The Logix system of SA Stud Book is the only South African privately owned computer database and application internationally certified by the International Committee on Animal Recording (ICAR). ICAR awarded the Logix system, as well as all recording practices and services of SA Stud Book, with their certificate of quality. The system, as well as all other activities and services, are regularly inspected and scrutinised for adherence with the ICAR international guidelines. This certification not only focuses on individual animal records but also on information and reporting regarding participants, disciplines, and Societies' (or any controlling body) information. This makes the Logix system also the only privately owned South African database complying with the requirements of the Animal Improvement Act (Act 62 of 1998) of South Africa.



Complete information technology and database solutions are currently rendered by the SA Stud Book Logix system to 68 Breeders' Associations, as Registering Authority, in terms of the Animal Improvement Act. Among other services, these include data from 7 different species, 99 breeds or disciplines, 7 892 herds/flock/stables/kennels, 1.1 million active animals, 17.8 million pedigree records with over 50 million performance records, as well as 1 205 million genotype SNP records from more than 21 000 animals.

All services and database products are specifically tailor-made for each user's needs and include software development, database development, expansion and maintenance, reporting, data mining services, data analytical services, specialised advisory services, hosting services, and system backup services. In the case of livestock and companion animal breeding, specialised professional genetic, breeding and herd or flock management services are also rendered.



## The Stud Book team

SA Stud Book's system development and maintenance team consists of six full-time software, database, website, and APP developers, as well as five full-time SACNASP (South African Council for Natural Sciences Professions) registered researchers with the necessary statistical and programming skills. It includes four PhD members, as well as two MSc degree staff members.



## Computer Infrastructure, Database, and Independence

SA Stud Book has its own computer server infrastructure. Therefore, SA Stud Book is in the

position to develop and maintain a system for all users, including the individual Breeders' Society members. SA Stud Book also hosts the service.

The SA Stud Book computer server infrastructure is built on a replication model. That means that each application's computer server and host server are in real-time continuously replicated to a second physical server. All application servers are virtual servers and snapshots of the operational systems and file structures are created regularly and backed up at a secured off-site facility.

SA Stud Book Logix database is a state-of-the-art industry standard ORACLE enterprise edition relational database.

Back-ups of all databases and files are created daily on an on-site Network-Attached Storage (NAS) system and duplicated via a secure internet line to a second off-site NAS system.

All databases, information and files are therefore not only duplicated in real-time in the infrastructure of SA Stud Book but it is also backed up both on-site and off-site, daily.

SA Stud Book uses an accredited, ISO 2000 compliance computer and database consulting company, following the industry's best practices in optimising and maintaining its computer servers and database administration.



## System security and surety

The Logix system is designed and structured in such a way as to ensure that data security and privacy always receive the highest priority. This is, however, structured in such a way that the functionality of the database and system remains efficient but secure. The data security and accessibility design allow only authorized users to access the data intended for the specific security level. It is, therefore, a common practice that data authorization is awarded at different access levels for each user. No user can access any unauthorized data element or report. The system can, however, share any required data element,

information or report to any other authorized user or identity (inside or outside the system). Clients, such as Breeders' Societies with the assistance of SA Stud Book, can decide on and set security levels for subordinates and co-users.



## Integration, Data Exchange, and Document uploads

The Logix system integrates seamlessly with several other software and database platforms through different integrated methods, including APIs (Application Programming Interfaces), flat (fixed format) and CSV (comma-separated values) file data exchange and email protocols. Data and information are exchangeable both ways with third-party databases. The Logix system is, therefore, fully flexible and adaptable to different formats and APIs. Current APIs include those receiving and sending data to different farm computer software programs daily, as well as APIs developed to integrate and exchange data from and to various financial systems.

SA Stud Book's experience with third-party data exchange clients and systems has also resulted in the development and application of quality data checks based on biological (e.g., age at birth data, etc.), logical (e.g., sequence of events, etc.) and legal (e.g., ownership, data source, etc.) principles.

A comprehensive facility is in place for the uptake of scanned documents (usually in pdf format, but flexible), directly from individual users, data intermediaries, authorities (such as health authorities) and others. All originally scanned documents are accessible through an electronic cross-reference system, linked to a specific recording event (e.g., the uptake of a new horse, athlete, etc.), identification (e.g., identification document of an athlete, etc.), email or other types of correspondence, or even a photograph.

Automated processes are usually applied, resulting in the generation of required pre-compiled reports. These reports are automatically emailed to the different clients and users, as required from any predetermined schedule

by the client.

Due to the nature of the database design, the extensive knowledge, and experience of specialised staff, and the diversity of the SA Stud Book's Logix clients, every new or existing client can be serviced very effectively.

This system's flexibility, therefore, means that it can easily be adapted to fit the needs and requirements of each client. There are no two clients whose needs, and requirements, are the same.

As an example, the figure on the next page gives an overview of the system functions for Beef Cattle.

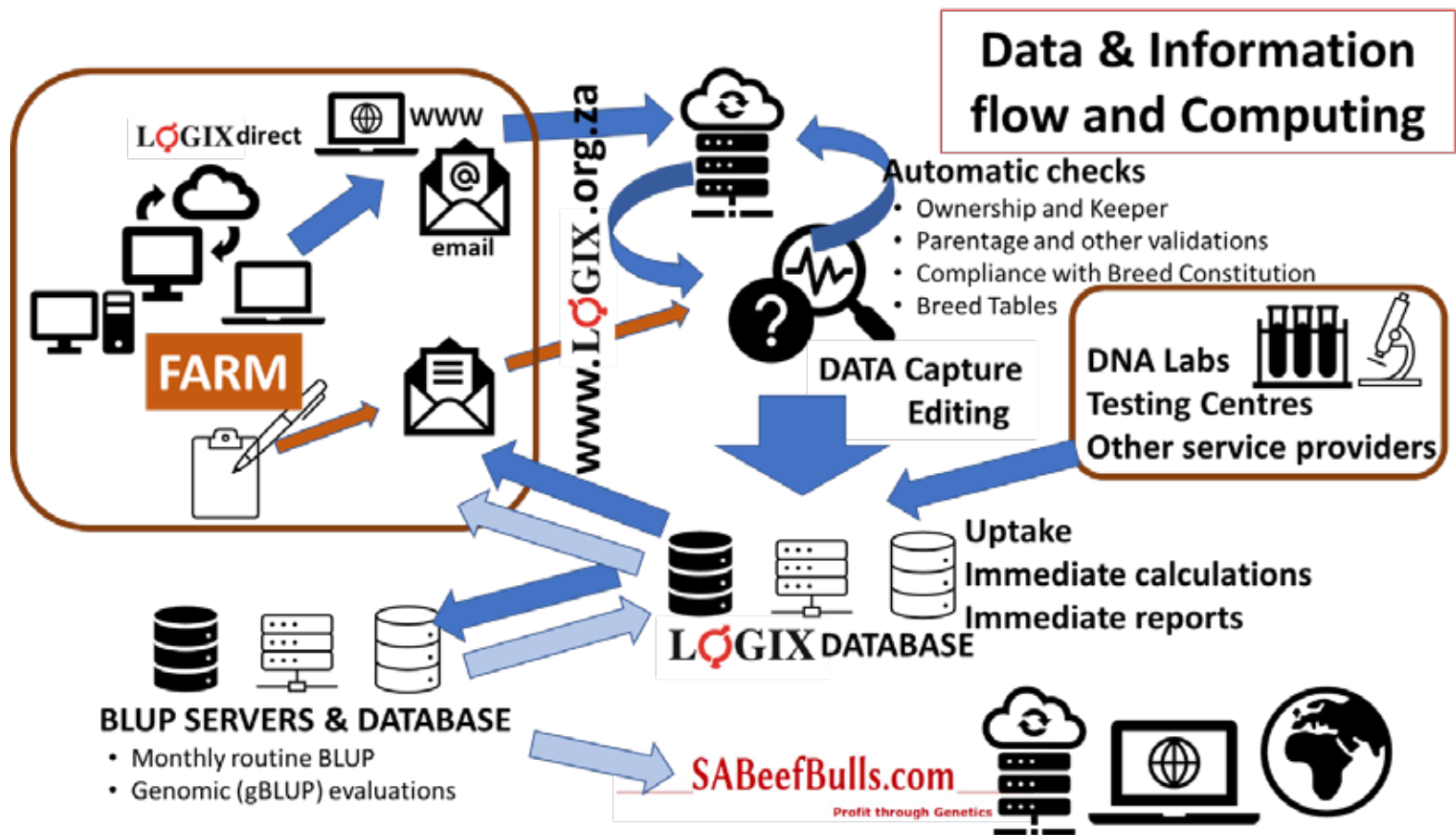


## Dealing with Electricity inconsistencies and supply

The SA Stud Book electricity wiring consists of three distinct supply lines, namely:

- The "White line" is linked to the major electricity supply from the service provider (Centlec). During normal electricity supplies from the service provider, the White line also supplies electricity to the two other supply lines. In 2019, Stud Book also installed a battery of Photo Voltaic solar panels, without battery backup, generating electricity (inverted to alternating current of 220 volts) during sunshine hours.
- The "Red line" supplies electricity to some electricity points, only those used to plug in personal computers and some lights in the building. This line normally receives electricity from the White line, but in the absence of supply by the service provider, the Red line relies on an external diesel generator. In the event of an external electricity cut, such as load shedding, the changeover to the electricity supply by the generator takes less than three seconds.
- The "Blue line" supplies electricity to the server room and switches linking the local area network (LAN) and wide area network (WAN) to the computer system and internet. When electricity is supplied by the service provider, the Blue line receives power from the White line via an additional system linked to three 5KVA (total 15 KVA) Lithium (solar system) batteries (with





This figure gives an overview of the system functions for Beef Cattle.

their own photo voltaic solar panels). Alternatively, in the event of any outside power cut, electricity is supplied to the Blue line (also via an additional three-phase inverter to the Lithium batteries) from the Red line as generated from the diesel generator. The normal constant electricity usage on the Blue line is about 4.2 Kilowatt (including all the computer servers, switches and air conditioners in the Computer Server room). All current on the Blue line reaching the Server Room is also fed through three Uninterruptible Power Supplies (UPSs) capable of keeping the Computer Servers running for at least an extra 20 minutes in the event of no electricity in the Blue line. Practically the 15KVA Lithium batteries are kept fully charged giving at least three hours (with the UPS system) to solve any problem in the event of the diesel generator not being able to supply electricity, or when no solar power is available. This is also backed up with a short message system (SMS), linked to a control room that

notifies SA Stud Book's service provider, looking after the electricity system, and internal personnel responsible for the Computer Servers. If all these systems fail, SMS messages are also sent to members of Stud Book (and Stemma Animalia), management and the Logix system service provider. The external Logix servers' service provider, with the assistance of internal personnel, therefore has ample time to shut down the databases and servers in the right sequence to secure that no data and functionalities are lost.

## Peace of mind

The measures in place to ensure data security, surety, and continued services 24 hours a day, seven days per week remain top priorities at SA Stud Book. These measures exceed computing best practices by far and serve as an assurance for Stud Book's members (the Breeders' Societies) and everyone using Logix.