

# System Overview of GeneSys Research Suite

## Summary

The GeneSys Research Suite is a single-tenant, on-premises solution designed for life sciences laboratories to manage sequencing data and analysis. It consists of a central desktop application (**GeneSys Core**) and three specialized web applications hosted via **Internet Information Services (IIS)**.

Data integrity and security are maintained through a tiered synchronization strategy that balances the need for real-time updates with the necessity of data validation for external sharing.

## System Architecture

Each client is provisioned with a dedicated Windows Server instance. While configuration is ~90% identical across clients, the specific web applications available depend on the institution's licensing.

## Core Components

- **GeneSys Core:** The primary on-premise desktop application and "Source of Truth." It utilizes a **Microsoft SQL Server** database to store all raw sequencing data and sample records.
- **GeneSys Portal:** A web-based interface for researchers to submit sequencing requests and track project progress.
- **GeneSys Insight:** An analytics and visualization dashboard for experiment results.
- **GeneSys Share:** A secure web application used to share sanitized or approved data with external partners.

## Data Flow

Connectivity between the Core database and the web applications is handled via two distinct methods.

## Real-Time Integration (REST API)

**GeneSys Portal** connects directly to the Core system using a **REST API**. This allows for instantaneous, two-way communication, ensuring that new sequencing requests are immediately visible to lab technicians in the Core application.

## The BioSync Service (Formerly BioBridge)

The **BioSync Service** is a Windows Service that manages data pushes from the Core database to the remaining web apps.

*Note: This service was renamed from "BioBridge" in v3.4; staff should use the name **BioSync** to maintain consistency.*

| Application | Sync Frequency    | Method               | Rationale                                                           |
|-------------|-------------------|----------------------|---------------------------------------------------------------------|
| Insight     | Hourly            | Direct SQL Sync      | Provides researchers with near real-time experiment analytics.      |
| Share       | Nightly (1:00 AM) | Database Copy (.bak) | Isolates external data to ensure only verified results are visible. |

## The Isolation Logic

To prevent unvalidated or incomplete data from being exposed externally, **GeneSys Share** does not connect to the live production database. Instead, it relies on a nightly snapshot process:

1. **Backup Generation:** At **1:00 AM**, a Windows Scheduled Task (GeneSys\_DBCopy) creates a copy of the database:
2. **Storage:** The file is stored in the standard directory:
3. **Service Sync:** The BioSync Service then uses this static backup to refresh the data displayed in the Share web app.

## Technical Specifications

### Hosting & Ports

- **Web Server:** Microsoft IIS (hosted on the local Windows Server).
- **Database:** Microsoft SQL Server.
- **Default Ports:** \* Portal:
  - Insight:
  - Share:

## Authentication Matrix

| Component       | Authentication Type    |
|-----------------|------------------------|
| GeneSys Core    | Windows Authentication |
| GeneSys Portal  | OAuth 2.0              |
| GeneSys Insight | API Keys               |
| GeneSys Share   | Token-based            |

## Maintenance & Known Issues

### Stale Data in "Share"

If a client reports that the Share dashboard has not been updated, the most likely cause is a failure of the task. This typically occurs when **low disk space** prevents the file from being created.

### Service Connectivity

The BioSync Service must be configured to run under the **SYSTEM account** to ensure it has the necessary permissions to read the SQL database and write to the web application directories.