

Requirements

The Perinatal Institute administers the Gestation Network www.gestation.net which provides tools for assessment of fetal growth and birthweight by defining each pregnancy's growth potential through the Gestation Related Optimal Weight (GROW) software, including the GROW-App and -API. Both needed to be highly available systems, securely allowing users to create customised growth charts for pregnancy and birthweight centiles.

The App and API enable users to create a growth chart based on maternal information using algorithms defined by the Gestation Network. These charts have to be available as a printable PDF and held within the mother's notes. The chart needs to be created in a way to allow clinicians to accurately plot fundal height and estimated fetal weight.

The API includes the additional functionality of allowing the chart to be retrieved as an image (as well as a PDF) for display in the implementing system and the ability to create digital plots that are added to the chart image.

Both systems enable calculation of birthweight centiles, based on Gestation Network algorithms. Both systems store data in a non-patient-identifiable form.

Technologies

The GROW-App has been written as a web application in order to be highly available, increase ease of deployment and simplify application management. Web applications provide the advantage of being platform-independent, meaning they can run across a wide range of devices with little need for specific implementations. It was also decided that as the main target audience would be the NHS that this system would need to be compatible with older browsers (IE7+).

The GROW-API has been written as a REST API to allow relatively easy implementation. The API allows request over the widely used Hypertext Transfer Protocol using simple but understandable verbs and can accept and return data in both the XML and JSON formats.

For development, it was decided to use the Microsoft stack as the main implementation technology as the skillset required was readily available, the stack is mature and well used/tested and implementation resources are abundant.

The technologies used were:

- Microsoft SQL Server 2012
- ASP.NET MVC
- ASP.NET Web API
- jQuery
- JavaScript
- C#

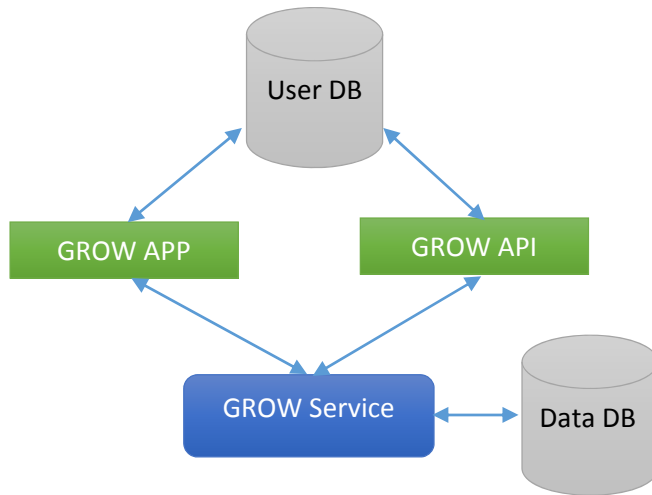
Architecture

The system is split into 3 separate projects;

1. An internal web service that would handle the data and calculations
2. A website that would be the GROW-App and would call the web service
3. A web API that would be the GROW-API and would call the web service

The system uses two separate databases, one to manage users of the system and another to store the actual data.

Architecture diagram:



The web applications and databases are hosted on Windows 2008 R2, IIS 7.5 and SQL 2012 Enterprise.

Security

Both the App and API are secured via username and password. The app requests these via a login screen whereas the API expects them in the header of each call. As usage of the system is based on a yearly GAP programme accreditation, each account is given a start and expiry date and are renewed each year.

Both systems require communication over HTTPS to ensure the security of patient identifiable data during transfer. No patient identifiable data is stored. Details regarding our information security management system and supporting policies can be provided on request.