



Modernisation Options for IBM Domino V10

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1. Introduction

In May 2016 Intec published a whitepaper entitled “Migration or Modernisation” which detailed functionality added in more recent versions of IBM Domino as well as considerations for deciding whether to migrate all or part of a Domino estate. The main outcomes were:

- The importance of extending appropriate functionality to newer platforms (web, mobile etc). Since May 2016, microservices and cognitive have become additional platform disruptors.
- The importance of ensuring a user experience that does not feel dated in comparison to other business and consumer applications.
- Being mindful of the benefits of Domino, e.g. backwards compatibility, data security etc.
- Data migration is a significant undertaking and often a hidden and not inconsiderable cost. There are ways to migrate an application without requiring migration of the data.

On this last bullet point, historically, “database” and “application” have been synonymous and interchangeable terms in the context of Domino. For many modern Domino developers, there has become a semantic difference. The “database” is where the data and possibly scheduled processes reside; the “application” is where the user interface and business logic reside. Increasingly these have been two separate NSFs and it is more important than ever to break free from the concept that they must be the same NSF.

At IBM Connect in February 2017, after a lengthy review, IBM announced their message on Domino application development modernisation and a number of reviews were published, including Intec’s own. The message was not a “silver bullet” approach, but an overview of potential approaches, some of which would be appropriate for some applications, some for others. Following this, in August 2017, Intec published a whitepaper “Modernisation Options for IBM Domino FP8+”.

In late 2017 IBM announced a partnership with HCL to launch a significant new era for Domino and associated products. At the heart of that was a commitment to Domino V10 in 2018 and a long-term vision for the products under the “Domino 2025” tagline – 2025 was not an endgame, just an initial marker. Jams and further announcements through the first half of 2018 have reinforced that vision and further defined the message around modernisation, focused on leveraging the investment companies have made over many years in the platform while embracing new and vibrant opportunities.

Throughout these announcements, open source has been at the heart of the message. And, although some Domino customers may have resisted open source in the past, that attitude is out-dated and unsustainable going forward. Whether modernisation or migration is the route, whether custom development platform or off-the-shelf, open source software is certain to play some part in whatever solution is chosen.

Choice and the importance of were two key tenets of IBM’s message. Domino as an application development platform has been a revitalised vision. The choices available may be confusing, so the purpose of this whitepaper is to give some more context, particularly in the context of Domino V10 and V11. Of course, an IBM Business Partner specialising in application development will be able to help offer more information and introduce you to partners, if you would like to investigate further third-party products.

The landscape has changed significantly over the last few years and some customers who were planning to migrate off the platform completely have re-evaluated their strategy. Enhancements for V10 have focused not only on modernisation options but also maximising total cost of ownership, to bring significant improvements to the platform with minimal effort.

But maximising the investment made by IBM and HCL in the platform means modernising both infrastructure and expertise. If you have not leveraged platform enhancements over the last decade like DAOS and indexing enhancements, you will not be getting the most out of your existing Domino servers. If your administrators are not au fait with the TCO enhancements coming in Domino V10, you won’t be getting the most of any upgrade. And if your developers aren’t up to speed with new user experiences, tools and techniques for development, your applications will not be able to be modernised in the most appropriate ways.

Regularly modernising any application requires effort and expenditure. But if a business is not prepared to invest in modernisation of application user interface, regardless of the platform, criticising and comparing those applications with ones that have been built more recently or modernised is unfair. The application slips from being well-maintained to being in maintenance mode. Comparing and criticising the platform those applications are built upon because the applications do not look modern becomes unfair.

2. Infrastructure Modernisation

Over the years as an organisation changes the infrastructure architecture may no longer be the best fit for the future role of Domino. Domino V10 is a good time to review and reassess. Section 4 provides some tooling for reviewing your Domino estate.

Historically Domino servers have tended to reside close to users because of network speeds. But networks have improved at the same time as more and more IT systems have moved to the cloud. Moving Domino servers off-site into hosted environment may now be more appealing. There are a variety of offerings from Business Partners, IBM and HCL. IBM's Domino Applications in the Cloud (DAC) is a flexible service including security, backups, monitoring, monthly health and usage reports and regular Domino version upgrades. It can also provide development, testing or high availability environments

3. Options for Modernisation

3.1 Notes Client / ICAA / HCL Nomad

Modernisation does not necessarily mean replacing desktop client access to applications. An alternative to the full Eclipse-based Notes Client is ICAA (IBM Client Application Access). ICAA is a much more lightweight client, comparable in size to the popular desktop clients of Slack, a persistent chat that has gained significant prominence and been a major disruptor for IT. Even when browser access is available, recent software releases have shown there is often a preference for standalone clients. This is understandable when auto-upgrading browsers regularly introduce breaking changes and fixed browser versions require all applications used by it to be upgraded at the same time, which is never achievable. Many modern clients auto-update, and both ICAA and the rich client bring new approaches to auto-updating with Domino V10.

The advent of Domino V10 brought the announcement of HCL Nomad, a Notes client for iPad. Notes access on iPhone has already been announced as the next step – smaller form factors will require greater changes to applications in order for them to be usable on iPhone. Android (tablets and phones) has been announced as a future goal but will require more significant development than iOS because of platform differences.

Domino and Notes have a strong reputation for backwards compatibility and many business-critical applications continue to work without any significant redesign of architecture or user interface. Some Notes applications look 15 years old, because no changes have been made to the user interface in that time. A little effort to modernise the user interface can give a considerable improvement in how modern the application looks and feels. In terms of modernising navigation, this could be small less ambitious enhancements like replacing Navigators with Outlines or moving to a more technically ambitious navigation model. Different approaches to quickly finding that one document the user wants to update can also bring a refreshed user experience. Amending form layout and styling is likely to take more effort, but can ensure an application feels more fresh. Particularly when your Notes application sits alongside native iPad applications, those applications deserve some love, now more than ever.

3.2 Web / Mobile Browser

The effort involved in redeveloping everything in a client application for web, mobile browser or native mobile applications may be significant. So, regardless of the chosen approach, it is critical to re-evaluate the functionality against current processes. It is important to bear in mind the devices in use and the target users against the functionality provided, because some use cases may not be relevant. Section 4 of this whitepaper covers some analysis tooling that may help with this preparatory work.

It is also key to remember that some admin tasks critical to the functioning of the application may rarely be undertaken, some configuration may have been forgotten and taken for granted by end users. If Domino will still be used, even if only for the database layer, some or all admin configuration could be omitted from modernisation, relying still on desktop Notes Client for occasional or limited access. Those managing these aspects of the application will typically also be more forgiving about the user experience.

3.3 XPages

For almost a decade XPages has been a preferred option for new Domino applications on the web. But XPages still competes well with non-Domino web frameworks in terms of rapid application development. The componentised approach is one standard with other Java frameworks and one JavaScript frameworks have adopted. XPages does have a definite learning curve and may not be the preferred option for developers who have not embraced the technology. But both IBM and HCL are committed to developers who have.

In recent years, at Intec we have seen a continued demand for training and mentoring. This is not to say that documentation is significantly deficient. The quantity and quality of books, samples, videos, tutorials, blog posts and community support is significant and better than many alternatives I encountered recently. As with any framework or technology, training typically gives developers a more intensified introduction to aspects and, when done well, prepares a developer well beyond day one.

Redeveloping a complete complex Notes Client or traditional Domino web application with XPages can be a significant task. Providing XPage access to a subset of functionality may be appropriate and could integrate well with Notes Client content in the HCL Places client. For existing web applications, a hybrid approach has proved popular, integrating XPage elements into traditional Domino web applications.

If XPages is used as part or all of applications, it is more important than ever to keep underlying platform up-to-date. Browsers can introduce breaking changes and manufacturers have also proved quite draconian in dropping support for older versions of frameworks. The most recent version of Domino will ensure core components and framework versions work on the most recent browsers.

3.4 JavaScript Applications and Integration

The rise of JavaScript applications and cloud services like the various Watson services have necessitated a microservices architecture. Today's applications are expected to integrate at least one way with third-party services. At the heart of this communication is REST.

For inbound communication it's important to remember Domino is not just a dumb NoSQL database. The power of the Domino APIs available give greater flexibility for building an API gateway. This means specific REST endpoints perform the workflow rather than expecting the workflow to be handled by the application layer, ensuring better security and consistent behaviour regardless of where the REST endpoint is invoked from. It also allows greater flexibility in what gets stored in the database from a specific endpoint, not necessarily a 1:1 relationship between REST call and document in the NSF.

There are a variety of REST service options for Domino, which is why Intec have developed a training course specifically covering REST and Domino.

3.4.1 Node.js

Node.js has become a popular web platform for writing JavaScript for microservices and applications. Modules and build tools allow slimline solutions that can just be REST services or a full web UI using popular JavaScript frameworks like React and Vue.js. With Domino V10 HCL will deliver the DominoDB npm module for Node.js developers. Significant enhancements at the C++ layer including DQL (Domino Query Language) have been made to optimise performance. Other modules opening up more of the Domino API are expected to follow.

This will enable companies to leverage their investment in Domino and the growing JavaScript development workforce. The output may be self-contained applications or middleware microservices as Node applications or on Node-RED, for integration by internal and/or external developers.

3.4.2 New LotusScript HTTP Methods

Domino V10 will also introduce new HTTP and JSON handling methods. This should make developing REST service access in agents an achievable approach for LotusScript developers.

3.4.3 SmartNSF

Announced at IBM Connect 2017, SmartNSF is an open source method of defining REST service routes within Domino Designer using a domain specific language. There have already been a number of releases through 2017 on OpenNTF.

Security, read/write restrictions, validation and pre- and post-processing events can be added to any REST endpoint created. Input / output can be values or computed formulas. An OpenAPI Specification can also be generated for JavaScript developers to code against.

3.4.4 Custom REST Services

For those preferring Java, the most flexible option for REST access to Domino data is to develop custom REST services in a REST servlet.

There is more effort involved, that cannot be denied. But Intec have been heavily involved in custom REST services for Domino by open sourcing OpenNTF Domino API Starter Servlet on OpenNTF as well as writing documentation and recording a NotesIn9 episode on the project.

3.5 Java Application Options

XPages is just one of many Java frameworks available for developing a web or desktop application. At Intec, we have been using Vaadin for some years and have provided enablement published on Vaadin's own blog. But other frameworks like JSF are available. Which one you choose is a matter of personal preference.

The key choice is then how to deploy the application. Wrapping it within an NSF is unlikely to be an appropriate choice. There are then a number of options.

3.5.1 OSGi Plugin

If you wish to run the application via Domino's HTTP task, the usual approach will be to wrap the JavaEE application in an OSGi plugin. This is an approach Intec have used in the past. There will be some quirks, for example the Java servlet specification in use in Domino and integration with project dependency management tools like Maven. But there are blog posts that cover this and experts who can help.

3.5.2 Spring Boot

Spring Boot is an option for creating standalone applications and can use an embedded web server like Tomcat. If this is a preferred delivery option, it may encourage a particular Java framework for the application, e.g. Spring MVC or Thymeleaf. But there are also starter templates for building a web application with other frameworks like Vaadin. This might be a good approach for a client application, for example allowing web access to offline Domino data as an alternative approach to using Notes Client.

3.5.3 Vert.x

Vert.x is a toolkit for developing flexible and reactive applications. It is not limited to Java, but can be coded in Java. Vert.x-Web is a subset of tooling for developing web applications and HTTP microservices. There may need to be some development to support a particular framework, but there are open source implementations for many frameworks like Vaadin. One of the strengths of Vert.x is that it is non-blocking which makes it very performant and scalable for server applications. Whereas some database layers like MongoDB need a specific client to support non-blocking access, the core Domino API has always been non-blocking, making Domino well-suited as a database layer. Like the Spring Boot approach, interaction with Domino only requires inclusion of specific jar files from the Notes or Domino install. There have been blog posts on integrating Domino and Vert.x (at one point it was a candidate for Verse on Premises) and Intec have continued that research.

3.6 IBM-Highlighted Partner Products

Since the Opening General Session at IBM Connect 2017, in addition to XPages IBM have referenced partner products for modernising applications.

Darwino is not aimed at automated modernisation but at custom development to build an application to run outside of Domino on web or mobile, online and offline. The business logic is coded in Java and the user interface typically via a JavaScript framework like Vue.js or React. The Darwino product provides “write once, run anywhere” code conversion, although platform-specific functionality like specific iOS components can also be added. There are additional libraries for customising replication, managing authentication, supporting various NewSQL backends like SQLServer, JSON parsing, mail handling, preference handling, GraphQL and standard REST integration, microservices, filters, querying, scripting and server environment management.

We4IT's Aveedo provides an analysis and modernisation wizard for web and mobile, to quickly convert both simple and complex applications to an XPages-based interface. The ScanAlyzr element (with a free initial analysis of templates) will review analysis and complexity, giving an estimate of effort to migrate. The wizard migration boasts time savings of up to 70%. Workflow can be modelled via a visual interface and business logic can be coded in a variety of languages including LotusScript and @Formulas. The tool also provides multilingual setup, charting, and MS Office integration.

Team Technology's TeamWorkr provides analysis and mobile-first modernisation of Notes applications, making LotusScript and @Formulas usable on the web. The wizard exposes views and forms for read and write access.

4. Analysis Tooling

The first step for any modernisation is analysis, to identify what to modernise.

4.1 Panagenda's ApplicationInsights

At IBM Connect 2017, IBM announced that Panagenda's ApplicationInsights would be available as a free entitlement for Domino customers whose licenses have not lapsed. This was released in April with a related FAQ technote. The initial entitlement was for 12 months from April 11 2017 but was extended for another year in April 2018. The free license analyses the 50 most used application databases, although additional packs are available for opening up analysis of subsequent batches of 500 applications. The tool is available as a virtual appliance and gives insight into usage statistics and design analysis. The output provides:

- Overall usage and design complexity rankings
- Database, replication and Access Control summary
- Volume usage splitting between access from Notes Client and web
- Design complexity identifying number of design elements, total lines of code broken down by language and other metrics
- Design insights identifying operating system dependencies, mail dependencies and dependencies on other databases
- Analysis of code for readiness for use from web
- Analysis of hardcodings for e.g. filenames, IP addresses, email addresses etc.
- Coding relying on Rich Text or notes.ini variables
- Go from analysis to design elements in two clicks
- Perform full-text search across entire application code
- Deep-dive into analysis using a query builder DataMiner

Any analysis of code cannot identify redundant code because functions may be called externally (e.g. from another database), design elements or functionality may no longer be used, code may be commented out or unreachable and functionality may not be relevant for all methods of interface. Consequently, the output needs to be reviewed in the context of an understanding of the design and an understanding of the current business usage of the application. But it can provide useful information on next steps for an application.

4.2 Intec RADAAR

A significant amount of summary data is accessible via core and community APIs. Intec have harnessed and extended this with RADAAR (Review and Analysis of Domino Application Architecture Robustness). The tool provides a rich analysis of application information, in a single interface. Dashboards highlight areas for further investigation. By analysing design elements and profiling data, the tool is designed to provide areas for consideration whether the end goal is continuance on a more modern Domino version, modernisation with XPages or another UI framework, or migration from Domino. The overviews can also provide a window into the application for scenarios where ongoing support is being transferred to new experts.

The output is continually being enhanced, but version 2.0.0 provides:

- Overview of database sizing, version and inheritance.
- Overview of all database properties that can be set via Properties panels in Notes Client or Domino Designer, as well as some properties that are set by server management (e.g. DAOS, 16Mb summary field limit extension).
- View analysis including dashboard highlighting areas for further review like prohibit design refresh set, private views, high number of re-sortable columns, document count and view index size concerns etc.
- Agent schedule overview at database and server level.
- Agent analysis including dashboard highlighting short or long-running agents, agents without profiling enabled, agents that have not run recently or never run etc.
- Form analysis including dashboard highlighting Forms that have replication/save conflicts, orphaned documents, potential referencing integrity issues, response documents, prohibit design refresh set, encrypted / signed fields, authors / readers fields, high numbers of documents, high numbers of fields etc.
- Profiling of documents by created date and last modified date as tables or charts. The data is profiled by year and, for the last 12 months, by month.

For the reasons highlighted above, the tool only analyses application architecture, not code blocks. Its focus is on review and optimisation of the Domino application as a database store, not on any particular implementation of user interface within the application.

The tool is available as an XPages application with associated extension library plugin, requiring Domino Feature Pack 8 or higher. A version will also work with limited effectiveness via Domino Designer Local Preview, providing the Notes install is Feature Pack 8 or higher. The next release will also run as a standalone non-XPages application.

About The Author

Paul Withers has been working with IBM Domino since 1998 and has guest-blogged for Vaadin Ltd. He is one of the founding contributors for OpenNTF Domino API, a Java API that extends functionality for IBM Domino. He is also a contributor to CrossWorlds, an open source project for accessing Domino data from standard web applications running on IBM Websphere Liberty Profile. Paul was co-author for XPages Extension Library, published by IBM Press (2011). He has blogged extensively about using Vaadin to access Domino data and surfacing Domino data through custom REST servlets.

About Intec

At Intec we collaborate with our clients, bringing together business insight, significant experience and technology to provide a distinct advantage in today's rapidly changing business environment. Through our integrated approach to problem solving, solution design and execution we help turn our customers strategies into action. With over 30 years experience our mission is to help our customers to anticipate change and profit from new opportunities. The result of that experience and knowledge is a reputation for being trusted advisors and subject matter experts in a wide range of business and information technology areas.



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