

METASPEX

Technical Insights



This is the "Metaspex Technical Insights" series, a set of eight technical white papers giving a broad and high-level introduction to the rich and innovative concepts in Metaspex. The chapters are broken down into:

1. Metaspex Ontologies
2. Referential Integrity
3. Making Objects and Pointing at Them
4. Web Services
5. Indexes, Cursors, Multitenancy and Paginated Services
6. Security
7. Multidimensional Indexing and Search
8. Configuration.

You'll see that Metaspex offers many "history first" breakthroughs, elusive from the dawn of business applications. This is true progress.

The highest level of uncompromised productivity

Metaspex's concise and precise code input allows abstraction levels never seen before for uncompromised production-grade professional code. We've created our own business applications programming formalism. The C++ language is the host, but you only need a small subset any JavaScript developer can master.

When using Metaspex, you do not use any database API, any query language and any JSON/BSON or related DOM. No SQL whatsoever, anywhere.

Metaspex is substantially more productive than the wildest promises of any technology currently available. You can iterate daily, and at the end of every day you don't just have a prototype, you have a genuine system ready for production. There is no corner cutting of any kind. All this is achieved without the usual sacrifices in features or performance. With Metaspex you do not make toys. Prototypes are just versions of production-quality code.

User interface developers can start developing immediately without waiting for staging backends to be available. Metaspex code is easy to read, and serves as well as documentation for UI developers with any technical background, outlining web services query and reply payloads as well as endpoints.

Develop on your own hardware

Metaspex is a framework available on a wide variety of platforms. You can develop and run your applications on your own device, including a simple laptop or a \$599 Apple Mac Mini.

We do not generate code. You edit your code with your preferred tool and use a free off-the-shelf C++ compiler to compile your Metaspex code directly on your machine.

Application evolution is bliss

Thanks to its unprecedented abstraction level and support for multiple coexisting versions of data, Metaspex allows applications to evolve in minutes.

The exact same productivity gains enjoyed at application inception apply to evolution and maintenance.

All this enforces strict continuous operation.

Safer applications

Every aspect of the code is strongly-typed and validated by the compiler. This even includes cursors, multitenancy and paginated web services.

Metaspex allows you to cut ties from risky low-level layers.

Metaspex's unique and powerful referential integrity takes care of complex behind-the-scenes operations without the need to code error-prone housekeeping processes.

As a consequence, code that uses Metaspex brings us closer to “code is requirement is documentation” than seen previously.

A valuable benefit is that the need for testing is drastically reduced

Some of our backends have run continuously with thousands of daily users for years without crashing a single time or leaking a single byte of memory.

Move beyond conventional limitations

Metaspex ontologies allow you to describe applications that would be hard, if not impossible, to deliver today with conventional techniques. Metaspex ontologies unify the relational, graph and document models. You can even express grammars.

You can perform data-model-level integration instead of just weak microservices integration.

And Metaspex supports polymorphism both inside the database and for web services payloads, queries, and replies.

Capitalize on backend business components

Business applications no longer need to be bespoke, custom-created every time you build another one. You can define enterprise components and capitalize upon libraries of ontology

types and their corresponding behaviors. These components can be reused to build new applications even faster.

The entire industry has abandoned the idea of offering this essential element of progress, as it is technically very hard. Metaspex offers it.

Extreme performance

Metaspex web services run typically within a handful of milliseconds of real time, often less than one, even when they include database operations. It is not an ORM. Data is saved and retrieved directly without a mapping inside and from the databases supported. This ensures that no millisecond is lost.

Also, as Metaspex is a high-level specification framework allowing developers to write complete business application requirements directly, including complex data models involving cycles, it eliminates the need to use a costly garbage collector, while ensuring immediate and automatic object destruction. This is unique.

Future-proof extreme scalability

Metaspex-based applications scale both vertically and horizontally in a very simple manner. More cores or more machines with a simple network load balancer offer more throughput, whether you use stateless or stateful web services.

Without the need for a garbage collector, applications enjoy a direct unhampered benefit from more hardware.

Operate from a single data center location

Thanks to the extreme speed of Metaspex-based backends, even when adding costly network latency, most solutions can be operated from a single data center while still offering instant response time around the globe, keeping users engaged.

Tiny production footprint

A Metaspex-based backend providing hundreds of web services fits in a few tens of megabytes loaded only once in the operating system. This is equivalent in size to one web page with a few images. You can operate wherever you want, in a private or public data center. If you operate on a public cloud, your costs are drastically reduced.

Metaspex allows you to build applications with multiple microservices, but the need to resort to this level of costly complexity is reduced or eliminated.

Simplified DevOps

A Metaspex backend requires very little infrastructure and deployment effort. It can run easily and efficiently on a \$15 Raspberry Pi Zero or on the largest public or private cloud machines with hundreds of cores.

Copy the binary module in a web server, and you are running. Deployment could not, and cannot, be simpler. You do not even need virtualization.

Higher levels of security

Metaspex eats its own dog food to define a sophisticated security ontology that pushes the limit of what is possible while erasing the line between conventional security and a CRM.

Metaspex security manages users, organizations, communities, affiliations, solutions, licenses, roles, permissions and much more.

In an industry first, all these can be integrated into user-defined ontologies (e.g., a booking pointing at the user who made it).

Secure web services undergo a rigorous 15-step process for validation.

At the same time, Metaspex supports the most stringent standards for encryption and cryptographic checksums.

Security can be finely controlled in the configuration file. For instance, OAuth 2.0 behavior, inactivity timeout, and password constraints are among the numerous features which can be customized.

Microsecond-level multidimensional search

Multidimensional indexing and search allows use cases that go beyond what databases can do, with record high performance, bringing response time down to mere microseconds.

Unprecedented implementation flexibility

A Metaspex binary uses one or several configuration files to adjust its behavior.

Metaspex supports two hundred configuration keywords. In particular, you can choose the database products through pure configuration, or finely control your security policy.

This opens new horizons for diverse implementations without needing any re-coding or even recompilation.

To see production-level Metaspex-based applications code, take a look at

<https://github.com/metaspex/events>

<https://github.com/metaspex/interviews>

Special thanks to [Katharine](#) and [Norman Birkett](#) for their invaluable contribution to this document.

Do not hesitate to reach out to us to experience the product on your own machine and take a look at the full reference guide. Metaspex is free for non-commercial use.