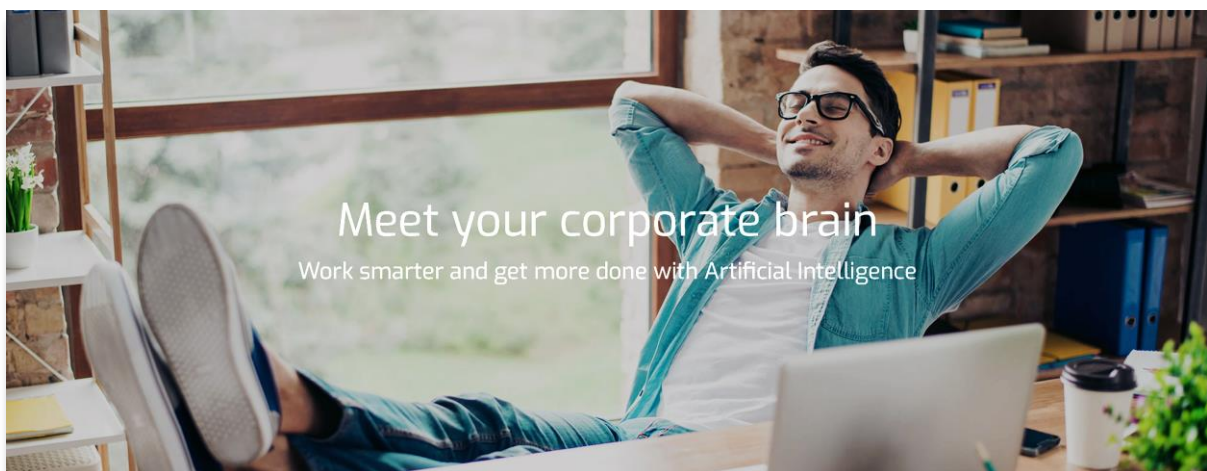# Search as a Service. For application developers.

Market leading plug and play functionality

- ✓ A proven solution

- ✓ Easy to get started

- ✓ More user-friendly

- ✓ More time for innovation, less maintenance

- ✓ Cutting-edge technology

A whitepaper from Haive.ai

Meet your corporate brain
Work smarter and get more done with Artificial Intelligence

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THOSE THAT MAKES THE FUTURE HAPPEN

Few other professions are as important for digitalization and digital transformation as application developers. Apps are the glue in the economy of the future, as the tool to improve lives, meet demands and enrich careers. Software is the soul of the computer, phone and tablet. Without it, the device will never be useful. Today people can easily find "an app for that" in seconds. Few know the massive amounts of time that have been spent in developing and maintaining that service. Many have heard about the developer, few understand how complicated his or hers job really is.

For developers by developers

To develop an application, you need many skill-sets, and the process goes through many stages including planning, analysis, design, construction, testing, implementation and support. The job starts with a need and then list of features to meet that request. This is also where our DIY-solution Application Search kicked off. At the Haive we invest vast amounts of time creating kick- ass search technology. It struck us that our technology could easily benefit developer-colleagues all over world. Therefore, we decided to make our search technology available as a DIY-service (do it yourself) for others in need of what we know best. We provide search, developers can focus on the rest.

Search as a service

Haive Application Search taps into the megatrend with cloud services as the preferred approach to develop faster, and with higher quality. We provide our tool as a plug and play service which removes the need for tedious coding and manual processes. This makes search available for both new and existing applications. Our solutions ensure less risk, faster time to market and more user friendly solutions for both those that develop and those that will make use of the application. For application developers, access to plug and play tools help improving the balance between innovation and maintenance, ensuring that less time can be spent on "keeping the lights on".

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THE NEED FOR SPEED

It is more important than ever with smart software services to increase operational efficiency, upgrade legacy systems, and delight customers and partners with breakthrough solutions. Speed is of essence for both corporations and the public sector. Digitalization and digital transformation have changed what we expect, and how fast we want it. Those that want to lead the race and fuel business growth need to come faster to market, with the best services. Agility is key, and a vital differentiator is the quality of the application development team.

Attract and retain talent

A large number of surveys point to disruption as a rising concern, driven by changes in customer behavior and preferences. The solution remains skilled application developers, which poses a challenge for those not being able to attract and retain the best talent. This also points to the challenge developers meet having to spend more time maintaining apps, stealing valuable time needed to develop the cutting-edge services that corporations need to lead in their market. Therefore, services like ours are vital to help development teams prioritize developing faster with higher quality, by adding a plug and play service vital to help users quickly locate the content they want.

Success gives challenges

As the amount of content grows in your application, users will have an increasingly harder time finding the golden pieces of data required for them to do their job efficiently. More and more data mean that it gets harder and harder to find things. The feedback from users show us that this is not even a linear increase. As data increases it gets exponentially harder to find what the user is looking for. And - no one deletes data anymore. It is just taking up space and making it harder to navigate through the data landscape. Hence; it's not a good idea to bypass great search and find technology.

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CUSTOMER STORY: SONANS EDUCATION

Sonans Education is Norway largest private provider of education on high-school level. They have 12 campuses, 11000 students and 7-8000 adults taking courses. They were not pleased with their LMS and decided to build their own. By developing the solution themselves, they have completely adapted it to their needs. They chose Haive Application Search as a core component, to improve navigation and ensure knowledge-sharing.

- Existing commercial solutions have more functionality than we need, while having limited possibilities for customization. Hence, we decided to make our own platform, says Terje Ravnsborg, director of IT and operations in Sonans.

Alf enables collaboration, while IT remains in control

The platform is called Alf and is very well received in the organization. Both students, teachers and administrative staff experience significant improvements for planning, collaboration and knowledge sharing.

> - After mapping our needs, we concluded that we were able to develop the set of functions we wanted by using our own developers, Ravnsborg says.

Haive Application Search is an important and core component

Early on in the project, Sonans knew that they would need a solid search function to ensure that students got the expected benefits from the platform. They wanted to be in control over the search as well. When speaking with Haive, they found a solution that could satisfy their needs.

- Haive Application Search could be used to build the search functionality into the platform. We received a starter kit that included a search engine and a simple to use API. The solution enabled us to define where and how the engine should get the information from our content store, and how the results of our users' queries should be presented. The implementation was a smooth experience, Ravnsborg explains. He adds that previously we used to browse menus to find material, but today, users search to find information. You could say that the search has become today's website menu.

We have competent developers in-house, and managed the implementation ourselves. The APIs from Haive have worked well for us, we did not need any additional functionality. We secured both indexing of the content and the GUI in a good way. We have not met any challenges, and the collaboration with Haive has been excellent when we have needed information.

Sonans is very satisfied with their new LMS. They have not calculated the savings yet but expect that Alf will be a very cost-effective solution. We now have a solution built to our needs and we are capable of managing new needs from the organization. The Application Search has contributed significantly to the success and our agility, concludes Ravnsborg.

THE SMART CHOICE

Application Search from Haive provides the easiest and best way to implement a truly professional search in applications. There is no need for separate installer and external search set-up, and the service is the smart choice for your applications because it:

- Provides end users with a superior search experience within the application
- Ensures less problems for developers with an "out of the box solution" that is easy to integrate. Search becomes as easy as working with an embedded database
- Yields quick return on investments, predictable costs
- Comes with rich security features and functions

Application Search taps directly into your systems with prefabricated processors, replacing a limited SQL search and negating the need for a custom open source solution for which you would have to invest time and employees on researching, developing, maintaining and managing.

All features for search included

Developers are able to quickly implement the best search experience possible for your application's end-users. Search features include:

- Built-in security system. Users can only find items that they are given access to. This adapts to any custom security solution you may use in your application.
- Smart and easy autocomplete for queries
- Workflow helpers where end-users are given pointers to similar or related items via a backend search
- Mini-searches in context-specific areas, or a plain old search interface with improved user experience.

The solution also comes with all features for search, such as synonyms, best bets, lemmatization and/or stemming, numeric searches, advanced categorization, security, advanced relevancy tuning, compound and composite words, Unicode, etc.

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WHEN DEVELOPERS CAN FOCUS ON WHAT THEY KNOW BEST

The result is best when application developers focus on the features that makes the application stand out, with attention and consideration to how it solves the specific issues that your customer's needs help with. This is the foundation of any app-maker, content is king. There are however some needs that are universal, such as being available on the right platforms, presenting a user interface that users can relate to and use.

How to let people find things

When designing how to "let" people find things there are, traditionally, a couple of different approaches and recommendations:

- Strict data quotas: Reduces the amount of data in the system making it easier to find the data left. But, in these modern days we know that *all* data is extremely valuable. This in particular regards to machine learning and AI techniques. The historical data is essential in training the AI how the organization handles its operations. In other words; it is unwise to impose quotas on users.
- Database search: A bold attempt at solving the issue and there are a couple of takes on how to solve this:
  - o Field search limits the search to given fields in the database and the user will have to know which field to search within. Good for when the user is a system-expert and have a good idea of how to find what they are looking for. But, for more general searches it is just about useless. And, it doesn't handle search in text within embedded blobs and documents. Full text search allows for a fuller database search, and the user does not have to know which fields the matching text is stored within. But this too has the limitations of not searching blogs and documents. Plus, full-text searches in databases are known to deliver limited performance when you compare it to a specialized search-engine. Not to mention the lack of advanced search-index features in regards to stemming, lemmatization, compound and composite words and more.

Both approaches are of course better than not having a search at all, but bear in mind that they perform worse the more data your application contains, exponentially.

The specialized search engine

The superior solution is a specialized search engine within your application data. Although there are several free open source offerings available, these still come with the need to invest a lot of time in setting up and maintaining the solution. There are also a few commercial suppliers (of both open and closed source) with varying need for support and competency. Some deliver installations on premise, some in the cloud. The support for item security and other search-specific features greatly varies. You will perhaps also invest a lot of time in understanding the domain and lingo of search. You may in the end find that this rabbit hole goes deeper than expected. Search can be surprisingly complicated, once you get deeper into the technicalities.

ALL YOU NEED IS APPLICATION SEARCH

At HAIVE we offer you a shorter and simpler path to the solution: Application Search gets you up and running with a search solution for your application with minimal effort and time. It is based on a solid and proven platform that has evolved for over 15 years. Permissions is built into the solution and every item indexed must have at least one permission to be even allowed into the index. The indexing chain is extremely robust and offers integration points at just about any stage. We offer indexes both in the cloud and on premise. We do recommend the "no-frills" cloud managed solution though, which makes sure that your system is running the most optimal solution at any time, patched with our latest and best version available.

Smart components out of the box

Haives search as a service for application developers comes with the following components:

1. **The core search-engine:**
   - We host the core search-engine in a secure Microsoft Azure-environment. You can opt-in on redundancy and choose which of the features that you want to capitalize on.
2. **Simple solutions for adding content to the search-engine:**
   - Rich documentation and samples on how to input data via our REST-based GraphQL API.
   - Sample connector library/application that creates a solid and stable process for connecting your data to the search engine.
3. **Simple solutions to present the search in your application:**
   - Our state-of-the-art Overlay UI that makes it possible to integrate a full-fledged search user interface into any web-based interface, with an as small integration surface as imaginable.
   - Our premade web-client that can be embedded via an iframe into your application/site and also contains options for tuning the look and feel.
   - Implement your own UI, using direct communication to the search-engine via our REST-based GraphQL interface

The most popular apps
A 2019 survey from Outsystems with response from 3300 application developers all around the world found that these apps are most popular just now:
Apps used directly by customers or business partners
1. Apps that support internal processes and operations, including analytics
2. Apps that replace core legacy systems that run the businessApps that involve machine learning/AI
3. Apps that involve IOT

separator

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THIS IS HOW YOU GET STARTED WITH APPLICATION SEARCH

At Haive we have many various ways of providing solutions and services to our clients, and this is how you get hold of and implement Application Search:

1. Sign up for a solution with HAIVE and we will deploy a solution for you.
2. Add data to the search engine (indexing), including any permissions scheme you may want to apply. There are multiple options available:
   a. Use our API to add/remove items to/from the search index. This can be a good choice for integrating directly into your application for when data is changed (or even as stored procedures in the database). This often does not solve the issue of doing the initial "crawl", or repopulating the index from start should you by some reason want to clear the index and start over.
   b. Use our Scriptable Connector Sample library/process to index data, where you supply the business logic to fetch the data to index. This is an executable that can run in our or your environment. You can choose to run it in your environment to simplify data access. Even though the API option is a very compelling choice, this often ends up being the actual choice due to it solving four things:
      i. A transparent, no additional dependency, solution. There are no integration points with your current solution or code that can somehow risk that the original application backbone fails and or crashes.
      ii. The connector comes with scheduling and a system that ensures that items that have not been sent to the index is not resubmitted on every iteration.
      iii. Can be run on separate hardware and although rare - it can also easily be scaled.
      iv. Handles both C# and Javascript[1] implementations of the logic needed to iterate the application data.
   c. Use our Connector Development Template to build your own connector, using your favourite IDE. Somewhat comparable to the Scriptable Connector approach, but yields even more customisation options for the developer.
3. Decide on how to authenticate your users (if your solution requires authentication).
   a. If you are in an application where the user is already authenticated you can authorize the search-queries sent to the search-backend via OpenID Connect JWT claims. The typical

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[1] Available Q1/2020

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choice is to setup an endpoint in the application that return a JWT given that the user is logged in to the application. This is a simple and very effective solution for these scenarios.

    b. You can also choose to use our AuthManager (built on top of the acclaimed IdentityServer) to manage search-identities, where the users can be authenticated and authorized in various ways.

    c. We can even integrate the AuthManager and the end-point created above to allow a full implementation of the OpenID Connect specifications, with minimal work needed to authenticate/authorize your users.

4. Choose how users can find items in the index. Applications traditionally run in the browser or as an executable in various operating systems. We offer solutions for both:

    a. Use our Overlay UI for the fastest solution. At the same time this also has the smallest possible integration pain while also being a complete full-fledged search interface. By just adding one javascript source tag and a one-liner to initialize the Overlay UI library your UI can embed a search directly in your application. When the user clicks the search-field and starts entering text the search-engine will use features such as autocomplete or search as you type to enhance the user experience. When results are ready these will show in an overlay on your page. When the user clicks a match in the results, the typical integration is for it to send the browser to that specific item-page in your application. You can also customize the link click-action if wanted. The initialization allows you to control the layout of the UI (positioning, with/without categories/facets) as well as how you want the search to behave (i.e. search-as-you-type, categories tuning). Typically, the one-line config also sets up how to get the JWT from your system to authorize the user. The Overlay UI will even make sure to renew expired JWT tokens automatically by inspecting the expiration time.

    b. Use our REST API to query autocomplete and searches and present the returned JSON search-results as you want in your application.

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MEET THE HAIVE

Haive is defined as "To be in possession of something important". We believe information is the biggest asset of any organization, which is also why we have adopted Haive as our corporate brand name. We build corporate brains, in a truly groundbreaking fashion. The Haive is a central that allows any existing application to report on activity. Like a beehive, all apps now have bees that pass along events and data into the "honey stream" of events in the hive. The data and events, the honey, is your gold. The backbone for this is great technology for search and indexing.

Raise the Bar for Corporate Intelligence

By combining human and artificial intelligence, the Haive raises the bar for your corporate intelligence. When men and machines work in perfect harmony, your staff is given an artificial assistant. AI is often described as swarm intelligence, metaphorically understood as how bees work together to create superorganisms. When information is filtered through the corporate brain, you create an intelligent organism where the right data flows to the right person at the right time. Your corporate brain takes the form of an artificial assistant providing insight and intelligence to all.

AI and Machine Learning

Haive creates solutions for the intelligent workplace, analyzing and making use of text and visual content in the enterprise. By combining the artificial and the human, your corporate brain delivers new standards of corporate intelligence. Imagine the business benefits when your organization is able to utilize all your knowledge? By combining artificial and machine learning techniques with processing power from cloud infrastructures, Haive allows you to easily "connect the dots" between different applications and systems. Insight flows to dashboards, both corporate and in the form of each workers artificial assistant.

We are The AI-company.

Try before Buy
We understand that one need to test our solutions before deciding on purchase and implementation. Being able to see, test and try is vital, and the quickest way to make the best informed decision. We will grant you a 30 day free trial period. You may use our solution for proof of concept testing, and there are no strings attached. Our skilled system AppSearchers and application developers are available for support and advice. The try & buy scheme also applies for resellers and independent software vendors.

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