The HAT Microserver Solution

The HAT solution consists of a set of nested templates that ensure “zero-knowledge” for the provider of HATs. It deploys the following:

- A tiered VPC with public, private and database subnets, spanning an AWS region and two availability zones.
- Security groups controlling what services can be reached and from where.
- A highly available ECS cluster deployed across two Availability Zones in an Auto Scaling group.
- A pair of NAT gateways (one in each zone) to handle outbound traffic.
- Two interconnecting microservices deployed as ECS services (HAT and Milliner).
- A set of RDS-based databases backing the microservices.
- An Application Load Balancer (ALB) to the public subnets to handle inbound traffic.
- ALB host-based routes for each ECS service to route the inbound traffic to the correct service.
- DNS routes set in Route53 pointing public domain names to the microservices.
- Centralised container logging with Amazon CloudWatch Logs.
- CloudTrail based logging for security-related events such as role and security group changes, root account activity, as well as changes to CloudTrail settings.

Encryption

Data at rest is stored in two forms:

- Files are stored in AWS S3 Key-Value Store.
- Data is stored in AWS Relational Data Store (RDS) Database Servers. File storage is configured with server-side encryption using AES-256 encryption. Storage policy enforces any file uploaded into the storage to be encrypted. Data in RDS Servers is stored in isolated databases for each HAT owner, encrypted at rest using AES-256. All logs, backups and snapshots for a Database Server are encrypted. Database Servers’ stand-by replicas maintained for reliability are also encrypted.

Data in transit

HAT infrastructure uses industry-standard tiered network setup, segregated into three areas:

- A public subnet reachable from the outside Internet. All communication is encrypted using SSL (HTTPS). Any unsecured connection is redirected to HTTPS endpoints. AWS Elastic Load Balancer (ELB) with application (HTTPS) level SSL is configured for load balancing and encrypted connection termination.
- A private subnet where (HAT) Application Servers run, only reachable from inside the public subnet using a limited set of ports (all denied by default, selected ones open) - managed using a combination of explicit routing rules and firewall settings. Communication between the public subnet and the application servers is not encrypted, however it is isolated from the outside and only communication between the SSL-terminating Load Balancers and Application Servers is enabled.
- A database subnet where database servers are placed, only reachable from inside the private subnet using a limited set of ports. Communication between the Application Servers and the Database Servers happens on a private, isolated network.

Segregation

Building on top of AWS Xen hypervisor based virtualisation solutions and the Virtual Private Cloud network virtualisation environment, all application servers run inside separate Docker containers, isolating them from one another. Multiple Docker containers may be scheduled to run on a single Virtual Machine (VM), however VMs isolate all resources used by the application server from other cloud tenants. VMs have no control over which containers they host and containers can be moved from one VM to another in response to changes in load and resource availability. VMs are never accessed by administrative staff directly (SSH login is disabled) and are instead orchestrated through daemon applications installed to the VMs at launch:

- Application Software container orchestration tools (AWS ECS) - all interactions are recorded in centralised system logs
- Systems Manager if any remote shell command execution is required - disabled by default; if enabled, all interactions are recorded and alerts generated

Database Servers (PostgreSQL) run separately, with one Database Server per VM instance and multiple databases running on the same Database Server. Each HAT maintains their data in a separate, isolated database instance with no data shared across multiple databases directly.

https://hattrex.org
HATDeX Platform

Technology Suite for full data interoperability, secure data mobility and fast data transactions for decentralised HAT PDAs

An ecosystem of **shared risks, shared costs, and shared data** for the good of individuals, organisations and society.

**Data Plugs** bring data into HATs from Internet applications with open APIs.

**Apps** from organisations get data from HATs through **data debits** and give data into HATs, writing into their **namespace**.

Data Scientists upload new **tools** - Pre-trained Machine Learning Algorithms / Analytics. Outputs go **only** into the HAT Database and are shared only through data debits.

https://hatdex.org
GDPR rights

GDPR rights for individuals serve to regulate centralised systems because personal data cannot be easily isolated within these systems to give more rights.

Right to be informed. Right to be told how their data would be used in a clear and transparent manner.

**Right of access.** Right to ask for their data (although the format is not stipulated so firms can give them an entire spreadsheet or PDF file).

**Right to rectification.** Right to ask firms to correct the information.

**Right to erasure.** Right to ask firms to delete their data.

**Right to restrict processing.** Right to ask firms to restrict its usage.

**Right to data portability.** Right to ask firms for their data in such a way that is machine readable.

**Right to object.** When users feel the firm is doing something to their data they disagree with, they have a right to object.

**Rights in relation to automated decision making and profiling.** Right to know what information is used to create their profile and where the firm gets its data from.

Decentralised HAT Microservers provide 5 more “ownership” rights to enable greater data mobility

**Right of possession.** Having their data stored in a place where they are the only ones who have access to the data.

**Right of control.** Being the only ones deciding who gets to use their data and when.

**Right of exclusion.** Deciding who doesn't get to use or see their data.

**Right of enjoyment.** Being able to use their data for their own purposes whenever they wish to.

**Right of disposition.** Being able to monetise, exchange, profit, license their own data because they own the rights to it.

The HAT Microserver was created to enable individuals to become data controllers and processors in their own right. It created, for the first time, the capability of holding, processing and controlling their own data for themselves. Such an “edge node” is critical legally and economically because it is important that its contents fall under existing legal frameworks of licensing digital media and content. As individuals, having database rights isn’t that new—the database sitting in an individuals’ PC hard disk would be theirs and they can do whatever they choose with the contents within it. The challenge isn't however, just database rights, but how the exchange of the contents within can happen quickly, and without fuss. The speed of such an exchange is termed data mobility and is the driver of efficiency and innovation (see UK government report on data mobility). Data Rights and Data Mobility are critical for the use of data and innovating on data services at the edge. Personal data must also be ethically sourced. Ethically sourced data is based on meaningful consent but even better, if based on licensing first party rights to an individual's data direct from the individual. This was why the HATDeX Platform was created around the open sourced HAT Microservers. The platform enables the fast execution of data transactions that preserve data rights of individuals with proper governance rules and clear contracts.

Children's rights

The HMI confirmation of the HATDeX platform, enables a parent or legal guardian of the HAT owner to take control over process of creating data debits—that is, to allow the parent to authorise the right to access on behalf of the child HAT owner. By gaining control over this process, the parent can exercise the right to stop the data exchange, in case the parent deems the exchange risky. More importantly, the parent at this stage, only sees the meta data, instead of all the actual value behind each data point, to make a decision on the consent. This ensures the protection of the child’s privacy as well, and avoids any breach of access to the child’s data, even by the parent.

Rights of the deceased

In a similar way to children's HATs, the ownership rights of HAT Microservers can be assigned to their beneficiaries should they die. The following process will be followed: The HAT “R.A.” (Rights assignment) functionality itemises the Instructions for when a HAT owner dies. This includes the email of the HAT owner and his/her HAT URL that will inherit the HAT owner’s database rights (beneficiary details), a “deceased” toggle and validation keys that the HAT owner puts into their will.
Users share data not through consent but the actual first-party licensing contract, much like they would license the music they create.
HATDeX Platform Economic Model follows that of credit cards. Credit cards, like HAT PDAs, are issued by Issuers. Money transfer from credit cards, similar to data transfer by HAT owners, are accepted by Merchants and they pay HATDeX transaction fees who, in turn, pay the issuer of the HAT that transacted. HATDeX runs the legal, economic and technological infrastructure for data transfers similar to the way Visa and MasterCard run the credit card payment infrastructure.

**HAT Merchants** (applications or websites) request for data from their users to provide a personalisation feature on their website or to sign on to the website with some data (e.g. email).

If the users do not have a HAT PDA, the application will vend/give a HAT to the user on demand. These HATs come from a HAT Issuer who have a business relationship with the HAT Merchant, enabling the merchants to give HATs instantly.

The user, a HAT owner, have a HAT PDA and can give data to the HAT Merchant.

HAT Merchant receives the data and provide the service to the user.

User is happy to receive the service for the data given.

HAT Merchant pays a data transaction fee to HATDeX for the legal, economic and technology infrastructure that made the transaction possible.

With his HAT PDA, the user/HAT Owner can go explore other applications where he can use his data for benefits.

HATDeX pays the HAT Issuer a portion of the data transaction fee.

Visit our HAT Issuer: [https://dataswift.me](https://dataswift.me)
The HATLAB Sandbox is the environment where new applications built on the HAT go through testing and compliance procedures before graduating to the live production environment. The sandbox contains:

- HATs that may contain experimental data or features.
- Service APIs that interact with in-development Partner Applications that may contain new features requested by partners.

Partners can make use of the Sandbox to familiarise themselves with APIs and Services of the HAT ecosystem. Partners are also expected to test their applications against the HATLAB Sandbox before being verified for access to the live HAT environment.

HATLAB is a research, development and innovation space for the consortium of HAT universities managed by the HAT Community Foundation.

https://www.hat-lab.org/sandbox

Book a call with the HATDeX team at https://hatdex.org
# HATDeX 2019 Price List (Sandbox)

## SANDBOX SERVICES

<table>
<thead>
<tr>
<th></th>
<th>3 months</th>
<th>&gt; 3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscription</td>
<td>Free</td>
<td>£10 per month</td>
</tr>
</tbody>
</table>

**Prices below are applicable only when Sandbox subscription is active**

### HATs

#### Hosting

<table>
<thead>
<tr>
<th>Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20</td>
<td>Free</td>
</tr>
<tr>
<td>21-100</td>
<td>£0.20 pHAT/pweek</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>£0.50 pHAT/pweek</td>
</tr>
</tbody>
</table>

All Sandbox HATs are unclaimed as a default

ALL Sandbox HATs are deleted weekly unless specifically requested otherwise

### Support/Maintenance

Free

### API Call charges

- **- own namespace**
  - Free
- **- other namespace**
  - Free up to 100 calls, 0.02p per call after
- **- computed data**
  - Free up to 200 calls, 0.05p per call after

### Storage

<table>
<thead>
<tr>
<th>Range</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>100M</td>
<td>Free</td>
</tr>
<tr>
<td>&gt;100M</td>
<td>0.50p per GB per HAT per week</td>
</tr>
</tbody>
</table>

### Conditions

- No minimum contract
- No minimum number of HATs

## SOFTWARE

<table>
<thead>
<tr>
<th></th>
<th>License</th>
<th>Hosting &amp; Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAT APP iOS</td>
<td>Free</td>
<td>Free</td>
</tr>
<tr>
<td>HAT APP Android</td>
<td>Free</td>
<td>Free</td>
</tr>
<tr>
<td>HAT APP web</td>
<td>0 (open sourced license)</td>
<td>Free</td>
</tr>
</tbody>
</table>
# HATDeX 2019 Price List (Live Environment)

## ISSUERS

<table>
<thead>
<tr>
<th>HATDeX HATs (USD)</th>
<th>HATs</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>0.20</td>
<td>0.1 G</td>
</tr>
</tbody>
</table>

- **HATs**: \(\text{p/HAT/p/mth (active)*}\)
- **Storage**: \(\text{p/1G p/HAT/p/mth}\)

### Certification

- **Registration and Featured Listing on HATStore**: £50.00 per annum
- **Certification with HCF**: £100.00 per application
- **Membership of HCF**: Issuers are expected to be full voting members of HCF

### Conditions

- Issuers that have their own application will pay merchant/vendor fees based on API calls charges below.
- HAT issuer receives 30% of API call charges paid by merchants for the HATs they interact with.
- Active HATs are those with at least 1 API call a month.
- HATs are deleted on instruction by Issuers.

## MERCHANTS/VENDORS

### Standard Rates

- **HATDeX issued HATs (USD)**: 0.05 \(\text{p/HAT/p/mth}\)
- **Other Issuer's HATs**: Determined by Issuer

### Certification

- **Registration and Featured Listing on HATStore**: £50.00 per annum
- **Certification with HCF**: £100.00 per application
- **Membership of HCF**: Membership fee dependent on category

### GIN Scheme*

- **Free vending of HATDeX HATs for 1 year or 100k HATs whichever is sooner**
- **Free first year**
- **Waived first year membership fee**

### DEX (USD)

- **API Call charges (Data Transaction Fees)**
  - Only own namespace data: 0.002 \(\text{per API call}\)
  - Include other namespace data: 0.02 \(\text{per API call}\)
  - Include computed data: 0.05 \(\text{per API call}\)

### Conditions

- Unclaimed HATs after 1 week may be deleted for DaaS.
- For Issuers, API calls will be charged for white labelled HAT app as own namespace data.
- Issuers reserve the right to delete dormant vended HATs after 1 month inactivity (2 email notification).

## SOFTWARE & SERVICES

<table>
<thead>
<tr>
<th>License/White label</th>
<th>Hosting &amp; Support</th>
<th>GIN Entrepreneur Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAT APP iOS</strong></td>
<td>£5,000 p.annum</td>
<td>Waived for first year</td>
</tr>
<tr>
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<td>£5,000 p.annum</td>
<td>Waived for first year</td>
</tr>
<tr>
<td><strong>HAT APP web</strong></td>
<td>0 (open sourced license)</td>
<td>£5,000 p.annum</td>
</tr>
</tbody>
</table>

### Conditions

- 20% discount for all 3
- Support charges include updating, maintaining app for core functionalities as agent on Appstore and Playstore + hosting whenever applicable.
- Support does not include support for added functionalities over and above HAT APP functionalities.

### Dedicated Cluster for Issuers

- **Set up**: £2000.00
- **Per month**: £500.00

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* [https://www.hat-lab.org/programs/ginscheme](https://www.hat-lab.org/programs/ginscheme)