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Internet Services Architectures
Backend-as-a-Service (BaaS)

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Three generations of web applications

- In 1993 the first specification of Common Gateway Interface (CGI) was published. Letter this year the first version of PHP appeared. The Dynamic Web Page era has just begun.
- In the early days the server-side code was mixed with HTML. We can call it the first generation of the web applications.
- The next logical step was to separate the application logic into specialized modules. This is usually done by so-called web frameworks (e.g. Django, Spring, ASP.NET to name a few), commonly build upon the MVC design pattern. We can consider it a second generation of web applications. This is currently the most dominant paradigm.
- Additionally we can talk about "second and a half" generation to name the applications build as RESTful (or similar like GraphQL) services, where the backend and the frontend are implemented as two independent code bases.

The Third Generation

- The web frameworks despite being very advanced, still has many drawbacks:
  - The paradigm is focused mainly on programming, while in the real use cases also the entire application infrastructure matters.
  - In many cases the code created by using web frameworks seems redundant.
  - We need programmers for developing and maintaining the application, even for very simple business logic.
- Some of this drawbacks can be overcome by so-called Backend-as-a-Service (BasS) paradigm which we may consider the third generation of web applications.

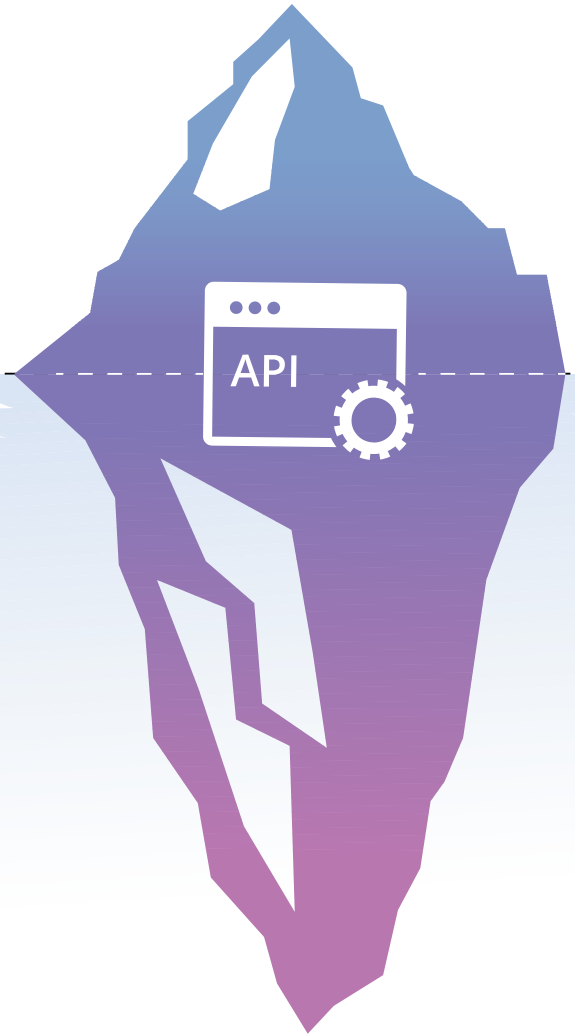
Backend-as-a-Service

- The main observation behind BaaS is that in web application backend much of the business logic is very simple and can be implemented by general components:
  - Database that will offer a permanent storage.
  - Authorization that will provide the access control for the database operations.
  - Communication protocol - usually RESTful API.
- The idea of BaaS is to provide the means for backend development without a single line of code. For this reason BaaS platforms are sometimes called low-code or no-code.
- Using a BaaS we only worry about programming the frontend what can vastly reduce the programming resources needed to develop an application.

Backend-as-a-Service

Frontend
(Developer builds)

- User interface
- Client-side logic



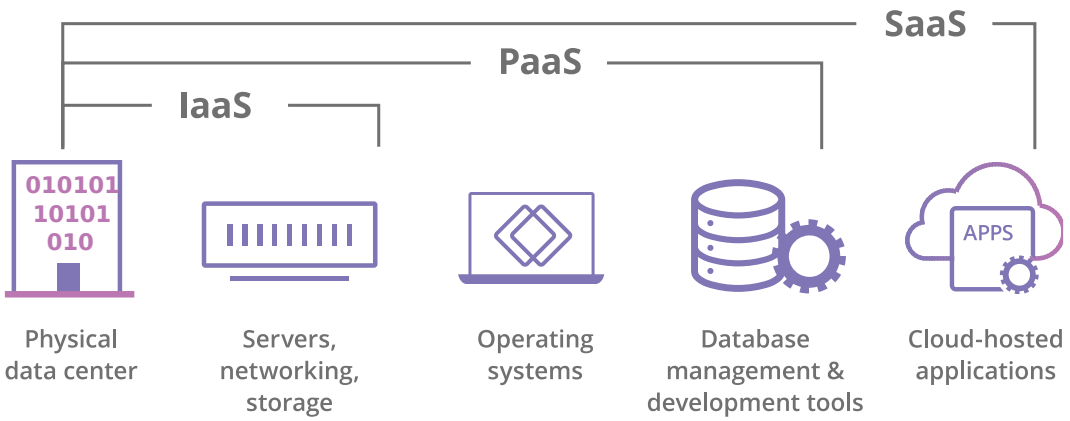
Backend
(Vendor provides as a service)

- Database management
- Cloud storage
- User authentication
- Push notifications
- Hosting

Source: https://www.cloudflare.com/learning/serverless/glossary/backend-as-a-service-baas/

Diffirence to: IaaS, PaaS, SaaS

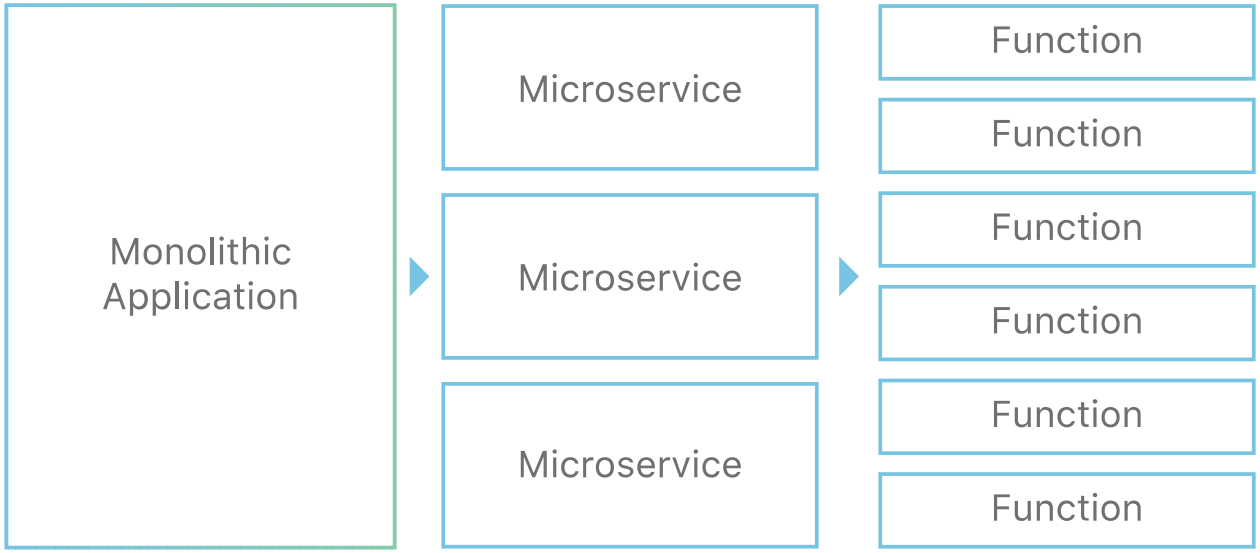
- IaaS (Infrastructure-as-a-Service) - cloud provider offers psychical infrastructure (e.g. virutal machines) that can be used by the client.
- PaaS (Platform-as-a-Service) - vendor provides cloud-based platform for building and running application. It usually include development tools, storage service and entire infrastructure.
- SaaS (Software-as-a-Service) - application that is run in the cloud.
- BaaS in contrast to PaaS does not require from you to write any code.



Source: https://www.cloudflare.com/learning/serverless/glossary/platform-as-a-service-paas/

Diffirence to FaaS

- Function-as-a-Service (FaaS) - serverless backend service that allows the developers to write modular pieces of code that are run in the response to certain events.
- In BaaS in contrast to FaaS:
  - You do not write any code.
  - The application is monolithic. There are not separate functions but one application API.
- But BaaS platform usually offers some form of serverless computing services in order to create a business logic that can only be expressed in code.



Source: https://www.cloudflare.com/learning/serverless/glossary/function-as-a-service-faas/

Most Popular BaaS platforms

- Google Firebase
  - The most popular BaaS platform today.
  - Hosted on GCP.
  - Provides SDKs for both web and mobile backends.
  - Data is stored in propriety database Firestore what makes it hard to migrate.
- AWS Amplify
  - Closest competitor to Firebase.
  - Provides SDKs for both web and mobile backends.
  - Offers full text search for your application by Elastic Search.
  - Similarly to Firebase based on propriety DynamoDB.
- Supabase
  - Open Source but also offers hosting.
  - Provides SDKs only for the web.
  - Uses PostgreSQL as a database - easier migration.

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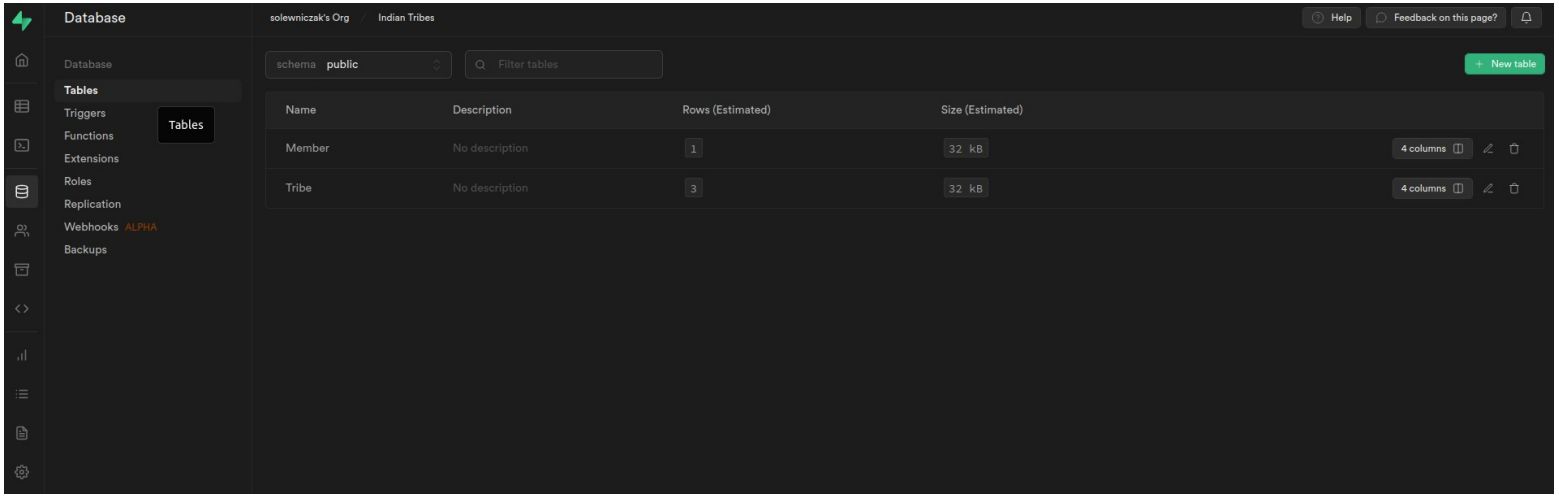
Live Demo: Supabase



Summary

- We will see if BaaS will be really the third generation of web development or just some side path.
- BaaS has definitely its advantages but can become awkward when backend becomes too complicated.
- There is very active development in many BaaS platforms. The idea is very fresh and worth to follow.

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HISTORY IS WISDOM
FUTURE IS CHALLENGE