BaaS'ed: Low code backend design with pocketbase

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Talk structure

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3. Backend-as-a-Service landscape
4. Building a complete conference schedule management system
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   - 4.3 Frontend Development
   - 4.4 Data Population Scripts
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5. Key Takeaways

About Me

Markus Vogl

- Student @ JKU
- Java Full Stack Engineer since too long
- Discord: #rnbwdsh#0022
- Passionate about modern development tools and rapid prototyping
- Building efficient solutions with minimal overhead
- Template, talk and project under https://github.com/rnbwdsh/socrates-fahrplan/
- Project + doc is in `fahrplan` branch, main branch is a template

Classic Backend Development: The Controller Layer

```java
@RestController
@RequestMapping("/api/talks")
public class TalkController {
    @Autowired
    private TalkService talkService;

    @GetMapping
    public List<Talk> getAllTalks() {
        return talkService.findAll();
    }

    @PostMapping
    public Talk createTalk(@RequestBody Talk talk) {
        return talkService.save(talk);
    }
}
```

Classic Backend Development: Service

```java
@Service
public class TalkService {
    @Autowired
    private TalkRepository talkRepository;

    public List<Talk> findAll() {
        return talkRepository.findAll();
    }

    public Talk save(Talk talk) {
        validateTalk(talk);
        return talkRepository.save(talk);
    }
}
```

Classic Backend Development: Repository

```
@Repository
public interface TalkRepository extends JpaRepository<Talk, Long> {
    List<Talk> findByRoomAndStartTimeBetween(
            String room, LocalDateTime start, LocalDateTime end);
}
```

Classic Backend Development: Configuration Hell

```java
@Configuration
@EnableWebSecurity
public class SecurityConfig {
    @Bean
    public SecurityFilterChain filterChain(HttpSecurity http) {
        return http.authorizeHttpRequests(auth ->
                        auth.requestMatchers("/api/talks").authenticated())
                .oauth2Login(Customizer.withDefaults())
                .build();
    }
}
```

Classic Backend Development: Even more

- Interfaces
- Unit tests
- Integration tests
- Configuration
- Logging
- Authorization and Authentication
- application.yml, pom.xml, Dockerfile, k8s manifests, CI/CD pipelines...

Why Backend-as-a-Service for Developers

- **API Generation:** REST + GraphQL from schema definition
- **Database:** Integrated with automatic migrations
- **Authentication:** OAuth2, JWT, role-based access control
- **Real-time:** WebSocket subscriptions without manual setup
- **Developer Experience:** Focus on business logic, not boilerplate
- **Batteries Included:** Ready to use features out of the box

FOSSS BaaS Landscape

Product	Core Lang	Database	Notable
Supabase	TS / MDX	PostgreSQL	89k GitHub stars
Appwrite	PHP	MySQL/MariaDB	UI stuff
Hasura	Haskell	PostgreSQL	GraphQL-first
Directus	Node.js/TS	Any SQL	CMS focus
Parse Platform	Node.js	MongoDB/PostgreSQL	True FOSSS
Kuzzle	Node.js	Elasticsearch	IoT/Analytics
PocketBase	Go	SQLite	Single executable, simple

Standard Features

OAuth2, Real-time subscriptions, File uploads, Role-based permissions, Admin UI, Multiple frontend SDKs

Shut up and build a complete conference management system

Step 1: Architecture: Frontend (SvelteKit)

- Responsive grid-based schedule view
- Real-time updates across all clients
- Views for talks and users
- Serverside + clientside favorite talks
- Talk editing for speakers
- User profiles
- Vibes

Example: fahrplan.events.ccc.de

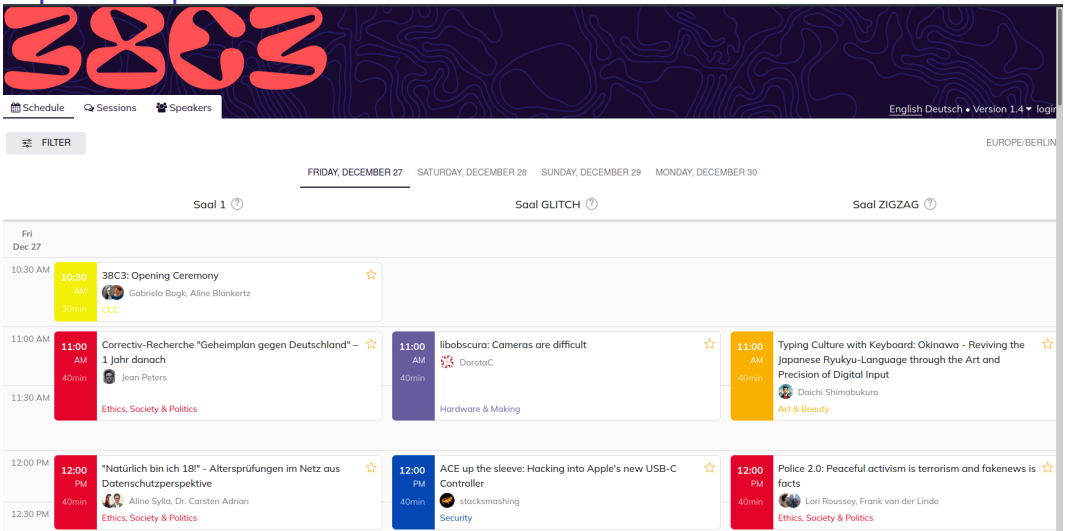


Figure 1: CCC Fahrplan

Step 1: Architecture: Backend

Pocketbase

- Golang is like non-stupid C
- SQLite is super fast and easy for a single server
- Svelte admin UI -> steal logic
- Made by some guy in Bulgaria (ganigeorgiev)

Features

- RESTful API with permissions
- Real-time WebSocket subscriptions
- File uploads for talk materials
- Talks, Users/Speakers, Rooms, Tags
- Validation hooks to showcase custom logic

DevOps:

- Build a docker-container, host with pocketbase webserver
- Automated data population scripts

Step 2: Backend + Data Structure - Database Design with PocketBase

Created 4 main collections:

- **Room** {name, floor} - (read+list all)
- **Tag** {name} - (read+list all)
- **Talk** {name, description, duration, speaker, room, tags} - custom
- **User** standard + {bio, website, talksToVisit} + login with username - (default + secret)

You can set per-table, per-operation permissions, i.e.

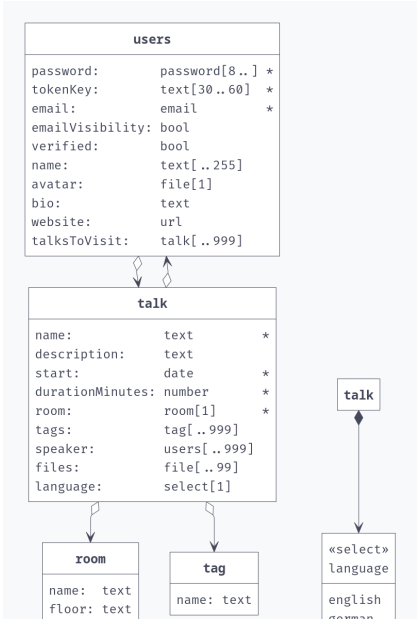
- UPDATE permission on talk `speaker ?~ @request.auth.id || speaker:length = 0`
- CREATE permission on user `@request.body.secret = 'socrates2025'`

Result: Automatic REST API + Admin UI generated!

Step 2: Generated Migrations from UI changes

```
func init() {
m.Register(func (app core.App) error {
jsonData := `{
            "createRule": "@request.auth.id != \"\"",
            "deleteRule": "speaker ?~ @request.auth.id || speaker:length =
            "fields": [
                {"name": "name", "type": "text", "required": true},
                {"name": "start", "type": "date", "required": true},
                {"name": "durationMinutes", "type": "number", "required":
                {"name": "room", "type": "relation", "required": true},
                {"name": "speaker", "type": "relation", "maxSelect": 999}
            ]
        }`
})
}
```

Step 2: Data Structure Visualization - Pocketbase-UML



Step 3: Frontend Development: SvelteKit + TypeScript + Svelte 5 Runes

Key architectural decisions:

- **Type Safety:** Generated types from PocketBase schema
- **Real-time:** WebSocket subscriptions to collections
- **State Management:** Svelte stores for favorites
- **Responsive Design:** CSS Grid layout for talk schedule

```
import type {TalkResponse} from '$lib/pocketbase-types';

pb.collection('talk').subscribe('*', (e) => {
    talks.update(current => [...current, e.record]);
});
```

Excursion: Vibecoding for haters

- Have a rules.md, i.e.
  - Keep the codebase minimal, clean and readable. Don't comment obvious things, i.e. `// Store for all talks` before `export const talks = writable<TalkResponse[]>([]);`
  - Inline variables and functions that are only used once, but try to create helper functions for 3x+ repeating patterns.
- Plan your tasks in steps, i.e.
  - The base page should be visible to everyone, even when not logged in.
  - Non-logged in users can favourite talks to their svelte-persisted-store, logged in users can favourite talks to their user.talksToVisit field.
  - The login page needs a secret field.
- A good spec is half the documentation
- If possible, pull just the needed stuff into context, or let it refine the planning before starting.
- Still use git!

Step 3: Smart Permission Integration

Frontend Rules Mirror Backend Permissions

```
const canEdit = (talk: TalkResponse, user: UserResponse) =>
    talk.speaker?.includes(user.id) || talk.speaker?.length === 0;

if ($currentUser) {
    await pb.collection('users').update($currentUser.id, {
        talksToVisit: [...($currentUser.talksToVisit || []), talkId]
    });
} else {
    favoriteStore.update(favs => [...favs, talkId]);
}
```

Result: Seamless user experience with proper authorization!

Step 3: Screenshot

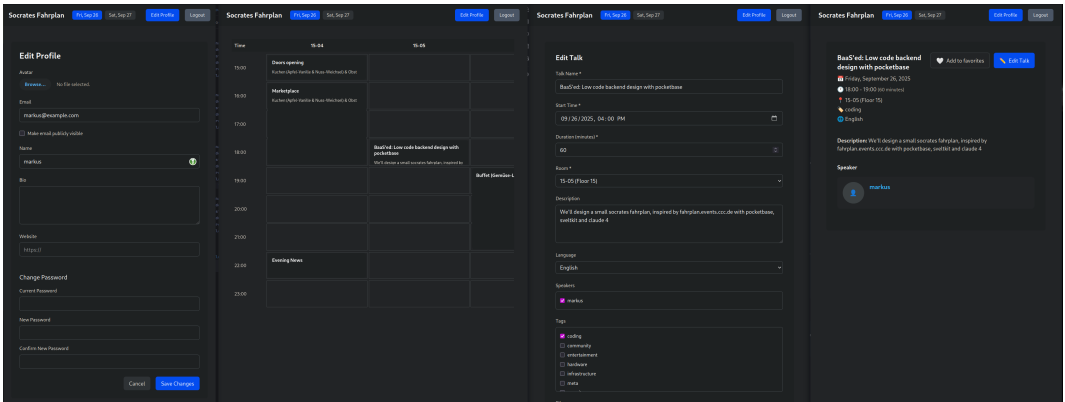


Figure 3: Screenshot

Step 4: Data Population Scripts - Node.js Scripts for Data Management

```
import PocketBase from 'pocketbase';

const pb = new PocketBase('http://127.0.0.1:8090');

async function insertData() {
    await pb.admins.authWithPassword('admin@admin.at', 'adminadmin');
    const rooms = [
        {name: '15-04', floor: '15'},
        {name: '15-05', floor: '15'},
    ];
    for (const room of rooms) {
        await pb.collection('room').create(room);
    }
}
```

Benefits: Repeatable data setup, easy testing, version-controlled seed data

Step 5: Advanced Validation Hooks - Go Hooks for Business Logic

```
app.OnRecordBeforeCreateRequest("talk").Add(func (e *core.RecordCreateEven
  start := e.Record.GetDateTime("start")
  duration := e.Record.GetInt("durationMinutes")
  room := e.Record.GetString("room")

  existingTalks, err := app.Dao().FindRecordsByExpr("talk",
  dbx.HashExp{"room": room})

  for _, existing := range existingTalks {
    if hasTimeOverlap(start, duration, existing) {
      return errors.New("Talk conflicts with existing schedule")
    }
  }
  return e.Next()
})
```

Step 5: Conflict Detection Logic - Smart overlap prevention

```
func hasTimeOverlap(newStart time.Time, newDuration int, existing *models.
  existingStart := existing.GetDateTime("start")
  existingDuration := existing.GetInt("durationMinutes")

  newEnd := newStart.Add(time.Duration(newDuration) * time.Minute)
  existingEnd := existingStart.Add(time.Duration(existingDuration) * time.

  return !(newEnd.Before(existingStart) || newStart.After(existingEnd))
}
```

Testing: Vibe coded 4 manual test cases for the 4 kinds of temporal overlap (start inside, end inside, enveloping, enveloped)

Key Takeaways

- Full system in 1h backend, 2h frontend, 1h testing, 1h presentation / documentation
- Easily extendable with custom hooks or serverside-code for business logic
- No more boilerplate and json-shoveling
- There is a BaaS for you and your favourite language

Thank You!