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[matrix] based school messenger

Schulchat *RLP*

Schulchat RLP

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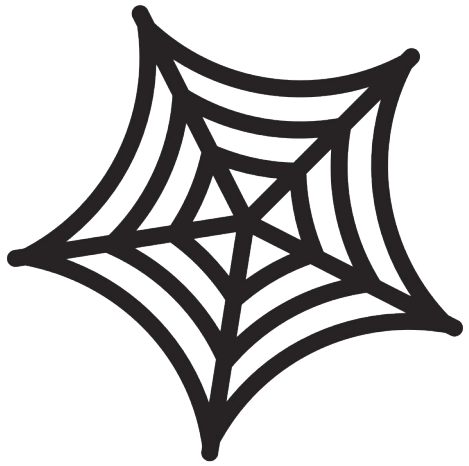
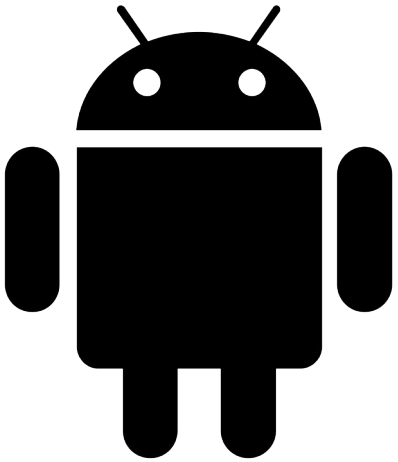


WWW



Android

IOS

Project context

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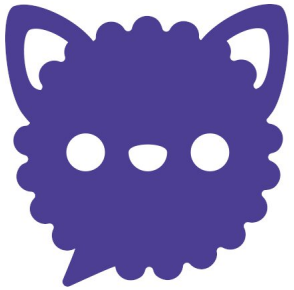


Fork of FluffyChat and Synapse

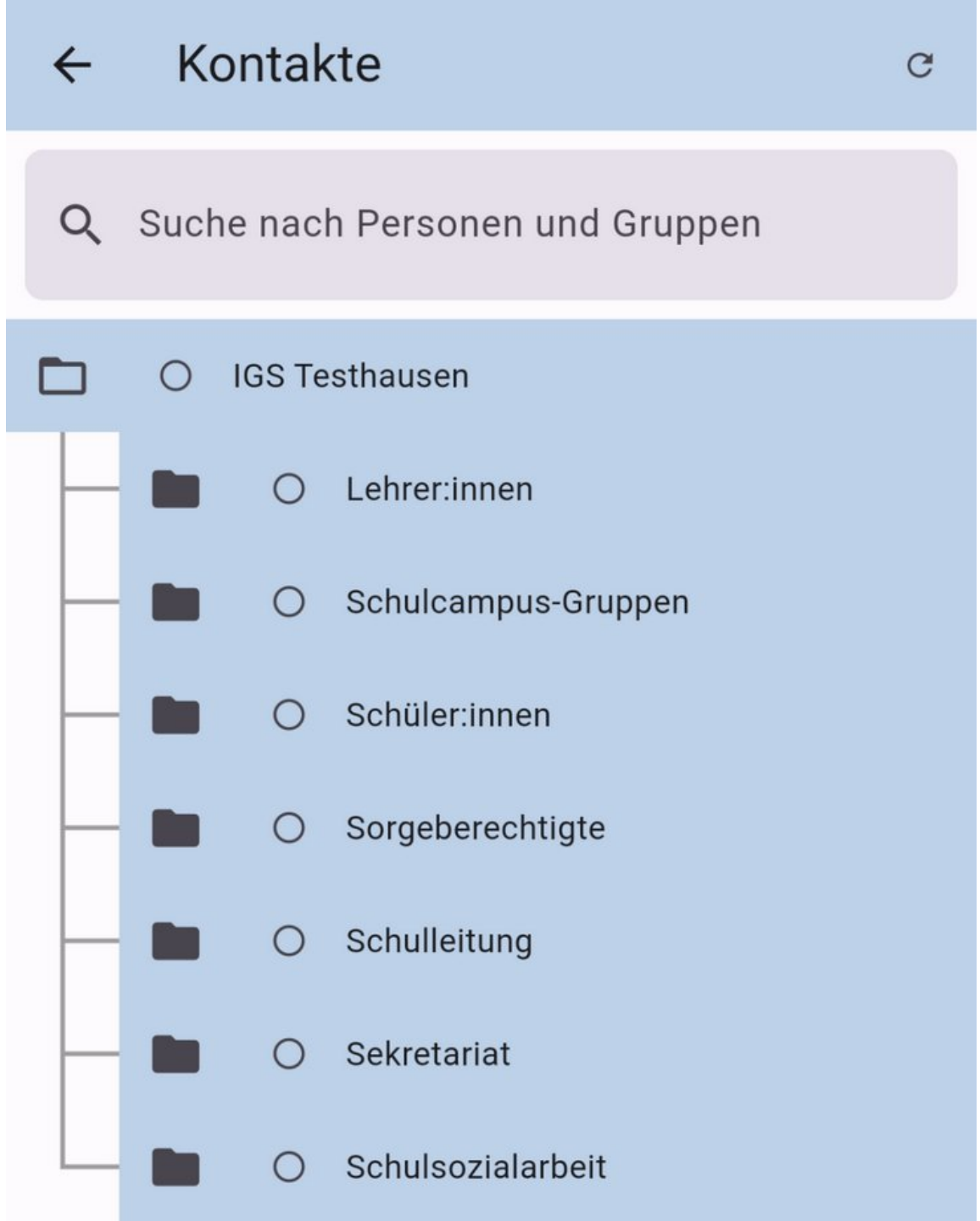
Project context

- Communication Platform
  for elementary up to vocational schools
- Target group: teachers, students, parents and school management
- Customer: Department of Education of the German state of Rhineland-Palatinate

- Name origin: Schulchat RLP —> **R**hein**L**and-**P**falz

Customization

- Educational adaptations:
  - Addressbook
  - Integrity condition
  - Communication Matrix
  - Dealing with abuse: reporting function
  - School Features (Simplifying the recovery key process, active read receipts, PDF-Preview, Poll-Survey Feature)
- Bildungsportal Integration
- Make it scalable for up to half a million users



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Addressbook

Integrity condition

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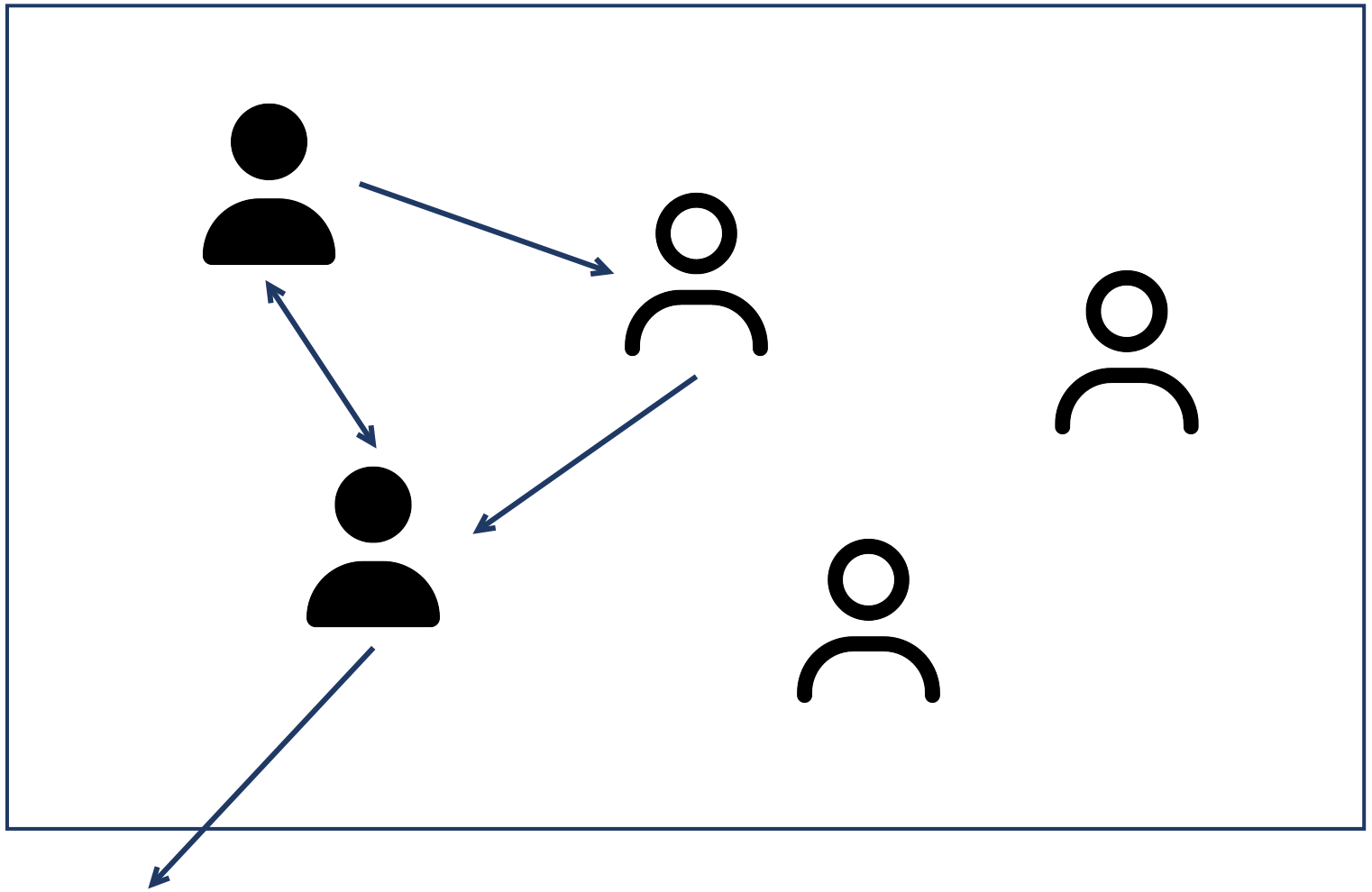

admin

moderator
power-level 100

participant

power-level 50

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Communication Matrix

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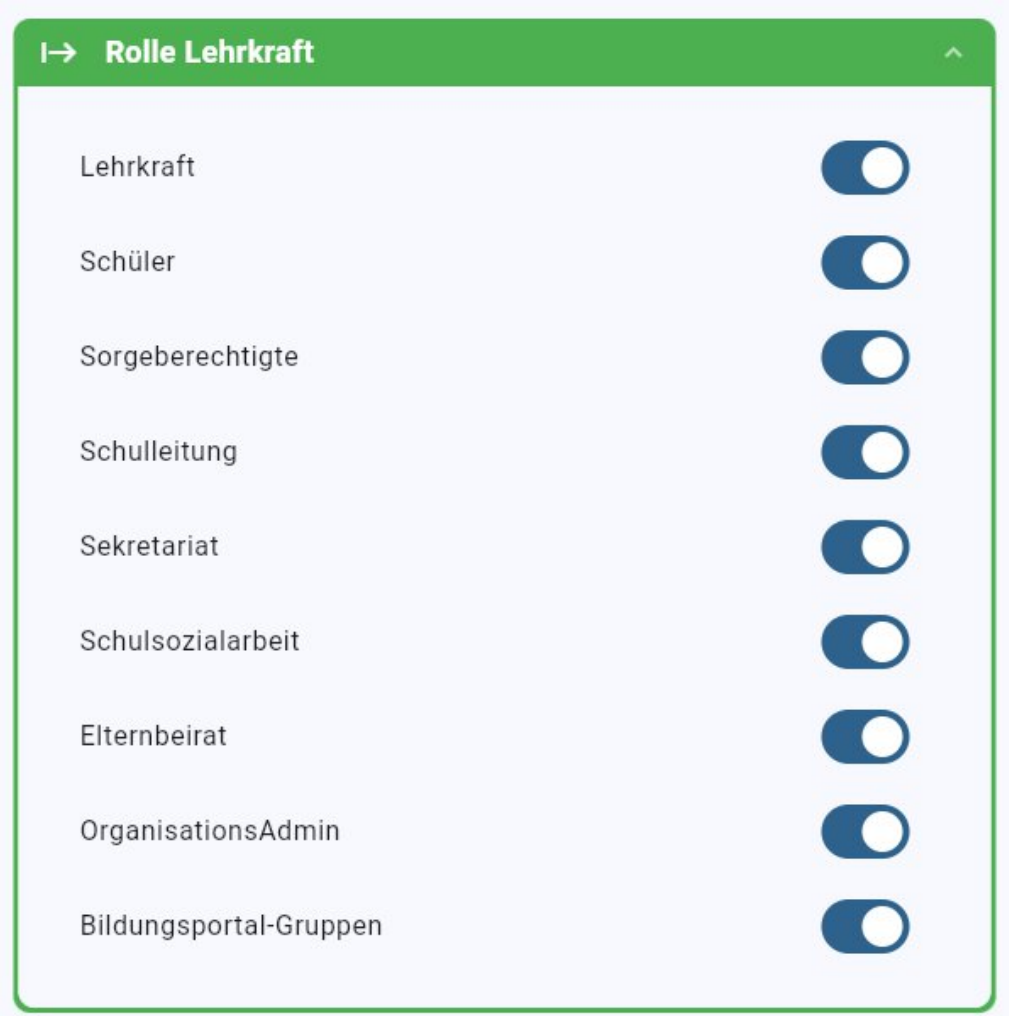
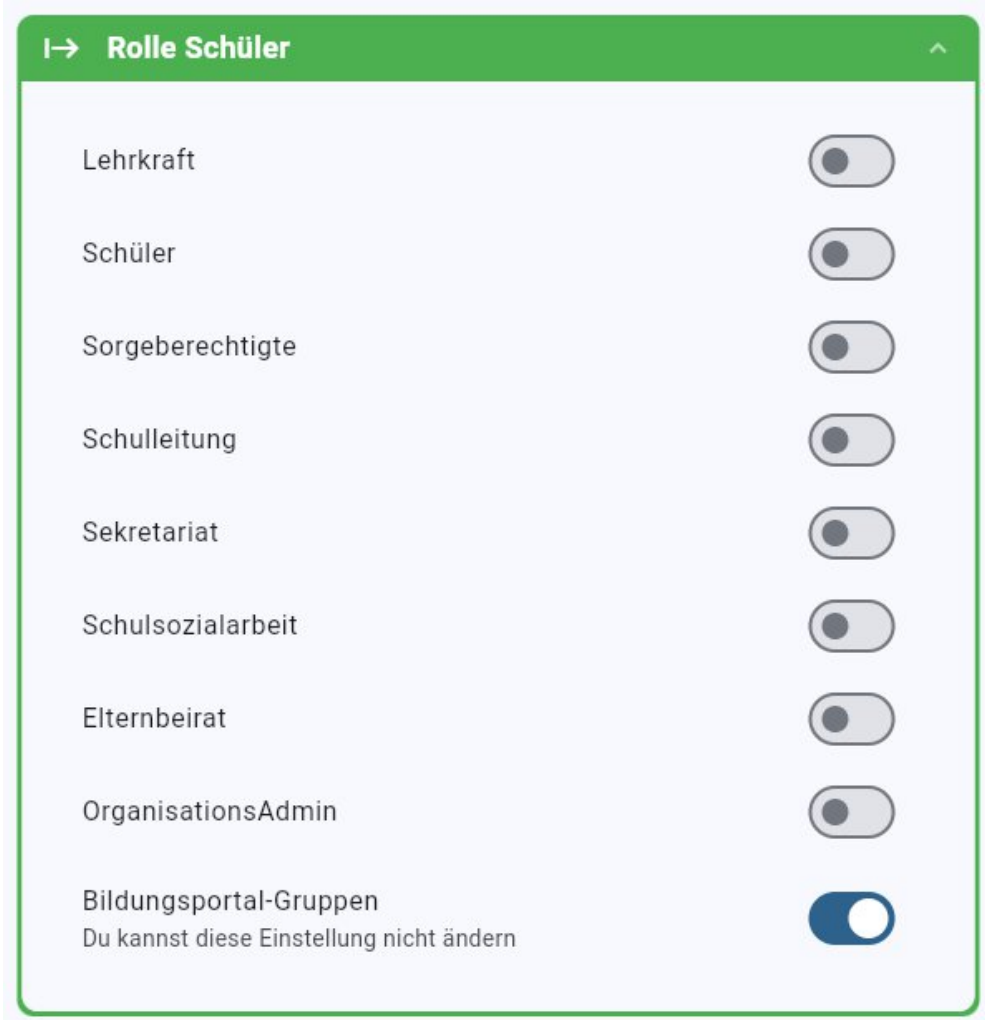
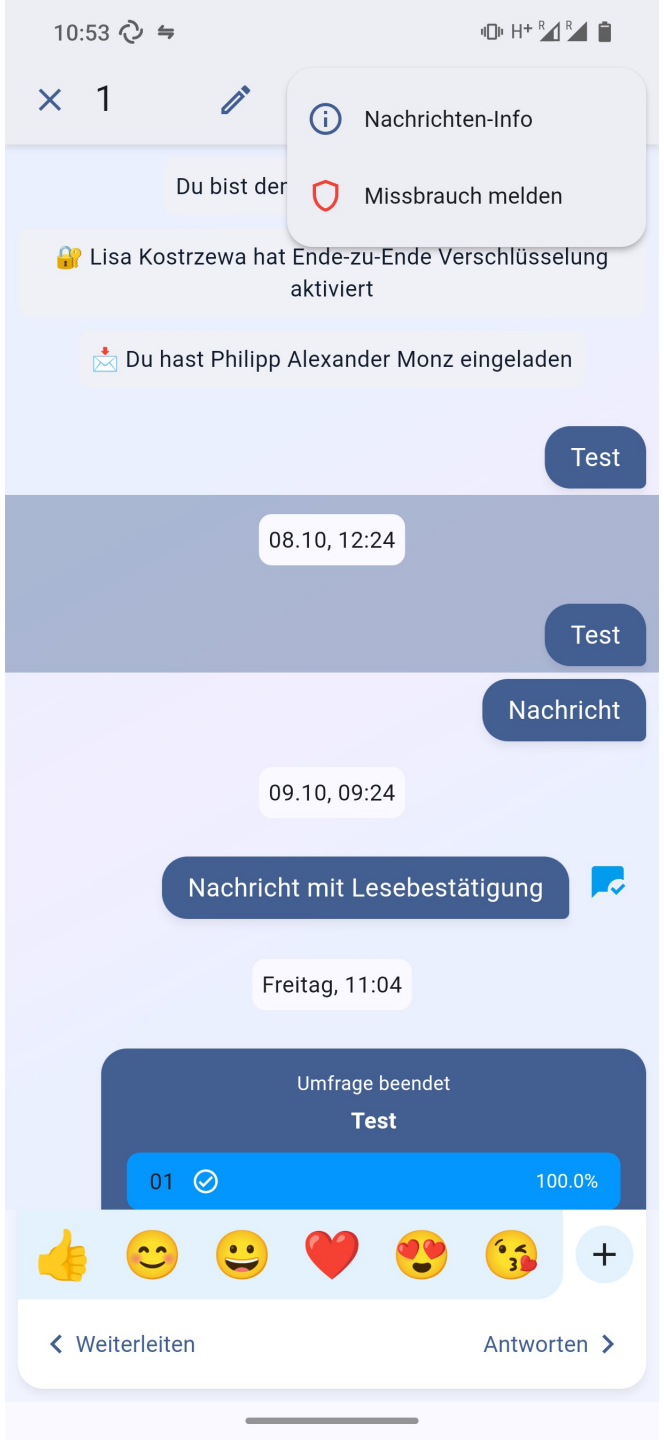
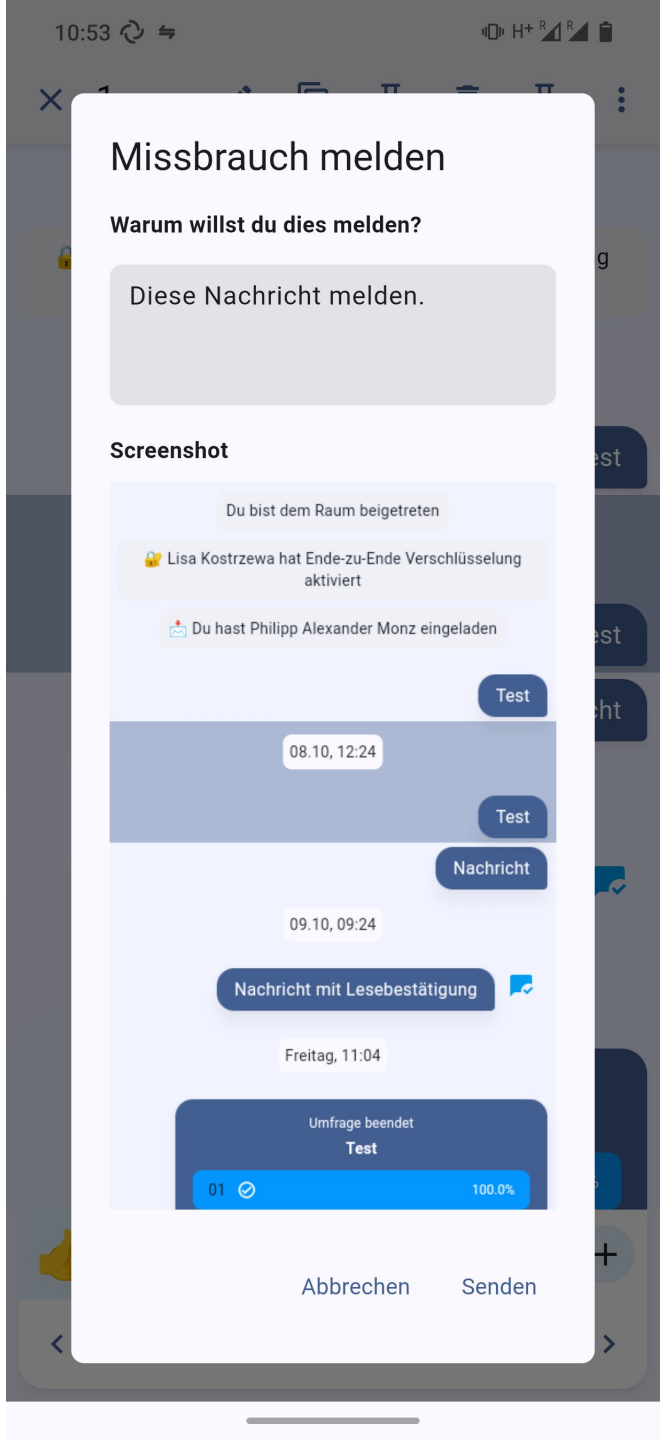

Rolle Lehrkraft
Lehrkraft
Schüler
Sorgeberechtigte
Schulleitung
Sekretariat
Schulsozialarbeit
Elternbeirat
OrganisationsAdmin
Bildungsportal-Gruppen


Rolle Schüler
Lehrkraft
Schüler
Sorgeberechtigte
Schulleitung
Sekretariat
Schulsozialarbeit
Elternbeirat
OrganisationsAdmin
Bildungsportal-Gruppen
Du kannst diese Einstellung nicht ändern





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Dealing with abuse

14:35

Klasse 8b Mathe

Du hast Schülerdrei Fairkom eingeladen

Das ist der Chatraum für das Fach Mathematik der Klasse 8b ➗

14:35

Bitte bestätigt den Erhalt der Matheaufgaben ✅

Schreibe eine Nachricht ...

Lesebestätigungen

Klasse 8b Mathe

14:35

Bitte bestätigt den Erhalt der Matheaufgaben ✅

Active read receipts

17:34

Lesebestätigungen

Philipp Alexander Monz

Read-only Raum

Test read-only Raum

Lesebestätigungen

Alle

offen

bestätigt

backupEins Test

BackupZwei Test

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Simplifying recovery key process

PDF Preview

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PDF Preview

aufgaben_loesung.pdf

1 / 5

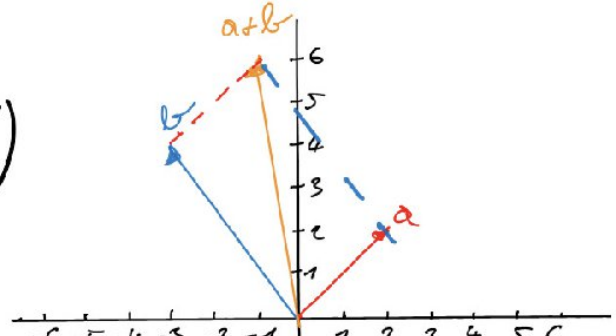
1. Zeichnen Sie:

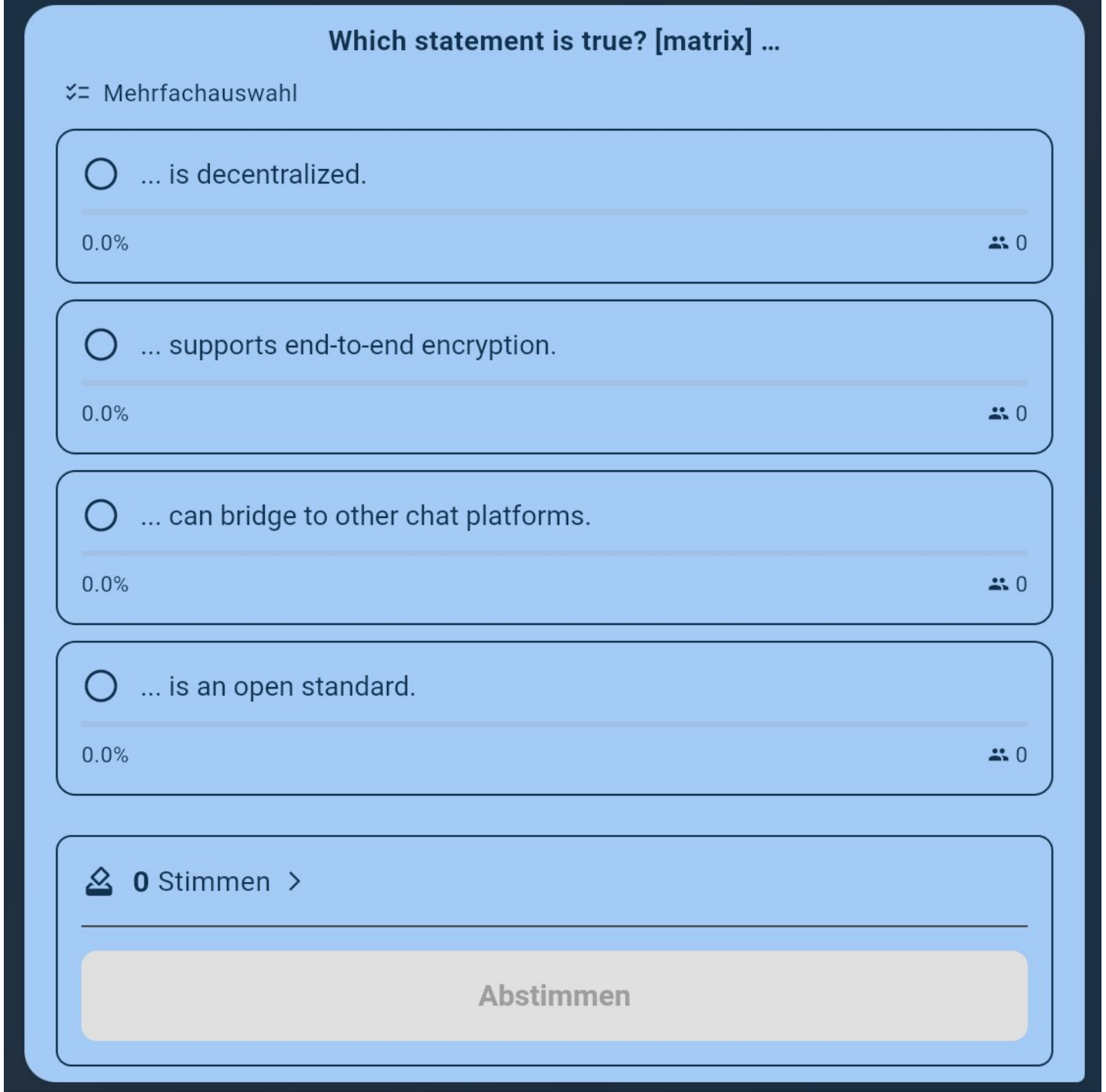
$a = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$, $b = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$, $c = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$

$a + b = \begin{pmatrix} -1 \\ 6 \end{pmatrix}$, $b + c = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

$a + b = \begin{pmatrix} 2 \\ 2 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \end{pmatrix} =$

$\begin{pmatrix} 2 + (-3) \\ 2 + 4 \end{pmatrix} = \begin{pmatrix} -1 \\ 6 \end{pmatrix}$





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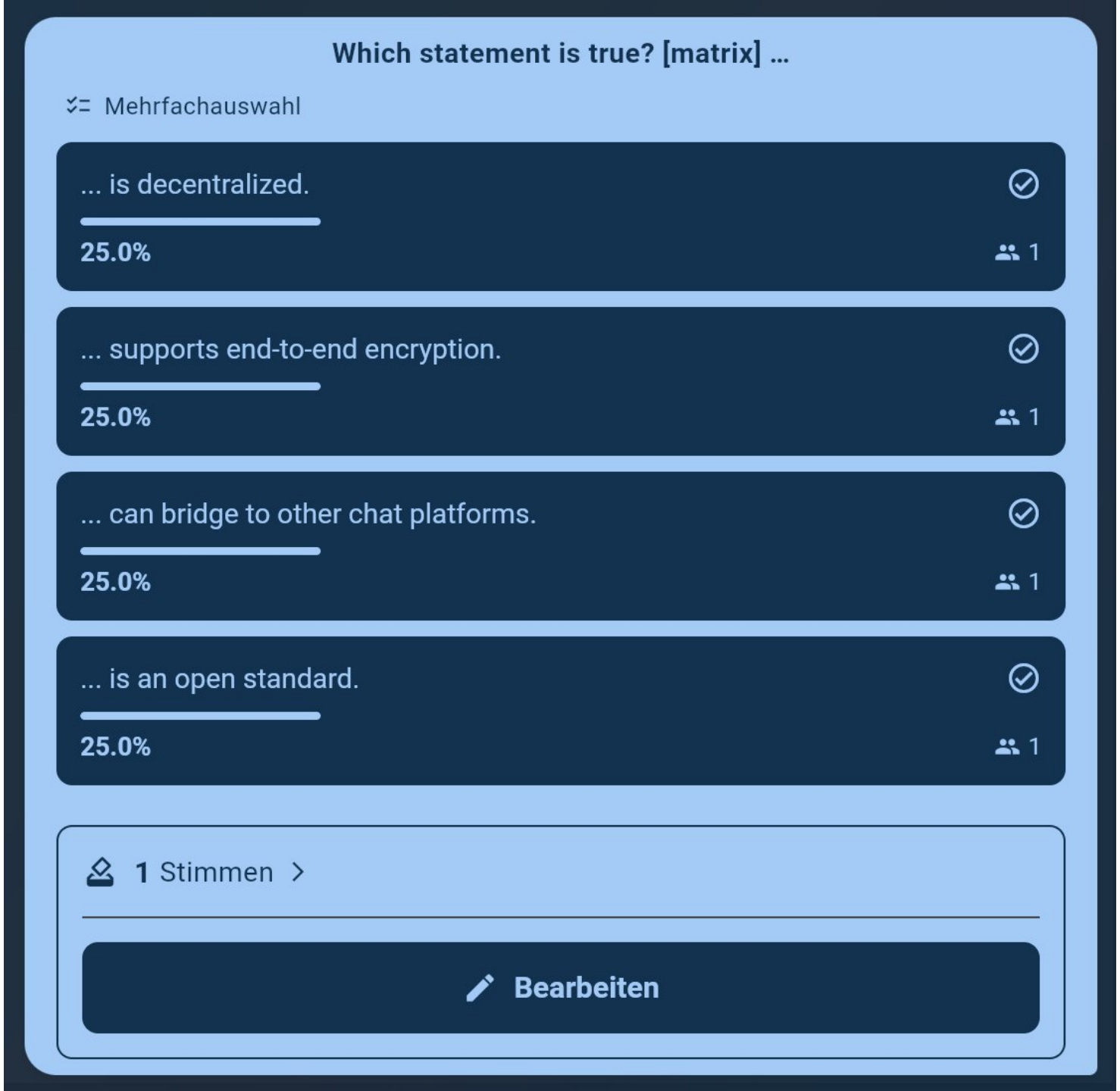
MSC3381 Polls



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MSC3381 Polls

Bildungsportal Integration

Hallo Philipp Monz,

was möchtest du heute tun?

SCHULCAMPUS AUSBLENDEN

- Dev Lernplattform
- Schulchat RLP
- meine Dateien
- Mediathek
- Curriculum
- Lehr- und Rahmenpläne

Bildungsportal Integration

- User/Room provisioning

- Interval-based
- Incremental

- Addressbook

OneRoster API Schools

Schools (/schools):


```
{
  "orgs": [
    {
      "sourcedId": "DE-TE-ENABLED-30000",
      "status": "active",
      "dateLastModified": "2022-09-19T11:27:19.000000Z",
      "identifier": "30000",
      "name": "GY Trier",
      "type": "school",
      "metadata": {
        "enabledServices": ["4c2a7910-2170-403b-adff-700ae1c39eca"]
      }
    }
  ]
}
```

OneRoster API Users

Users (/schools/{id}/users):


```
{
  "users": [
    {
      "sourcedId": "uuid-user-1",
      "status": "active",
      "dateLastModified": "2023-08-31T18:48:27.000000Z",
      "username": "keine.freischaltung",
      "enabled": true,
      "givenName": "Keine",
      "familyName": "Freischaltung",
      "role": "teacher",
      "orgs": [{"href": "DE-TE-ENABLED-30000", "type": "org"}]
    }
  ]
}
```

OneRoster API Classes

Classes (/schools/{id}/classes):

```
{
  "classes": [
    {
      "sourcedId": "uuid-class-1",
      "status": "active",
      "dateLastModified": "2022-09-13T10:31:33.000000Z",
      "title": "7a (2022/2023)",
      "classType": "homeroom",
      "school": {"href": "DE-TE-ENABLED-30000", "type": "org"}
    }
  ]
}
```

OneRoster API Enrollments

Enrollments (/schools/{id}/enrollments):


```
{
  "enrollments": [
    {
      "sourcedId": "DE-TE-ENABLED-30000,uuid-class-1,uuid-user-1",
      "status": "active",
      "dateLastModified": "2022-09-22T14:35:56.000000Z",
      "role": "student",
      "user": {"href": "uuid-user-1", "type": "user"},
      "class": {"href": "uuid-class-1", "type": "class"},
      "school": {"href": "DE-TE-ENABLED-30000", "type": "org"}
    }
  ]
}
```

IDM Provisioner

- **User-Provisioning**
  - OneRoster user ID becomes a Matrix user ID
- **Room-Provisioning**
  - Create Room: POST _matrix/client/v3/createRoom
  - IDM-Bot:
    - Add User: POST _synapse/admin/v1/join/${roomId}
    - Kick User: POST _matrix/client/r0/rooms/${roomId}/kick

Invite Group Example

1) User creates a room
2) User invites a group within the adressbook ->
than a join rule is set -> the room alias is created based on the school name and the group id:

#${school}--${groupId}:${domain}'

3) Synapse checks the join rule event
4) Next IDM sync -> IDM Bot invites users according to the join rule

IDM Provisioner

```
{
 "type": "m.room.join_rules",
 "content": {
  "join_rule": "restricted",
  "allow": [
   {
    "type": "m.room_membership",
    "room_id": "#school123--class5a:domain"
   },
   {
    "type": "m.room_membership",
    "room_id": "#schule123--teachergroup:domain"
   }
  ]
 }
}
```

Infrastructure / kubernetes

- Why k8s?
  - FOSS
  - Container orchestration
  - Extensible and flexible
  - Declarative
  - Scalable
  - Large ecosystem

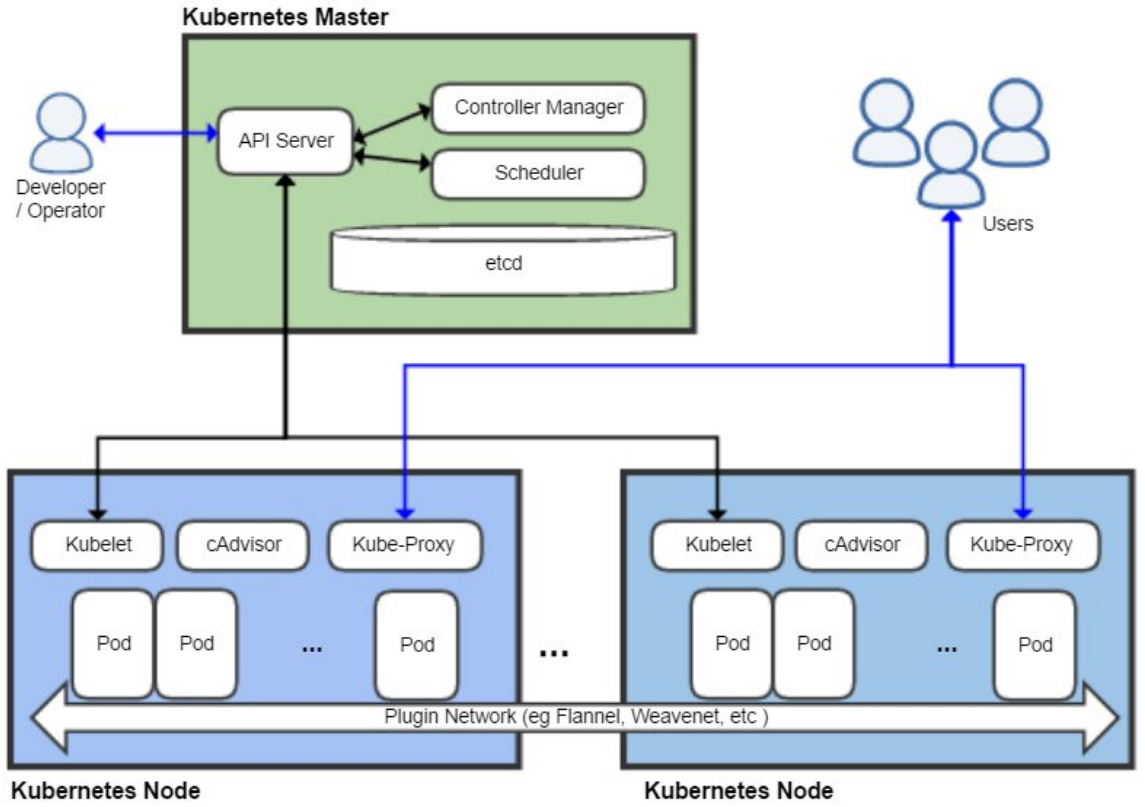
Fairkoms k8s Infra

- Baremetal
- Debian, k3s
- Hetzner

kubernetes

K8s basics

- Controlplane:
  - api server
  - scheduler
  - controller
  - etcd
- All k8s nodes:
  - kubelet
  - kube proxy
  - container runtime



K8s extensions

- DNS: CoreDNS
- CNI: Cilium
- Metrics
- Logging
- Operators
  - Rook.io (ceph storage)
  - Postgres (acid zalando)
  - Vault (Hashicorp, OpenBAU)

Our own k8s clusters

- k8s Distributions
  - k3s: simple, leightweight, single binary
  - rke2: full compliant k8s with bells and whistles
- Storage:
  - ceph: distributed platform for block, file, object
  - longhorn: simple block storage

Matrix Deployment

- Kustomize instead of Helm Chart
  - base + overlay
- Distributed Synapse Workers
  - Generic DP + specialised SF
  - Ingress paths
  - internal k8s (service/dns, pod name)
  - Event persistence, media repository, typing, presence, receipts..

Challenges / Storage

- Storage
  - Large VolumeMounts (media-store)
  - Linux mount + recursive chown/chmod under the hood

```yaml
securityContext:
  runAsUser: 1000
  runAsGroup: 3000
  fsGroup: 2000
  fsGroupChangePolicy: "OnRootMismatch"
```

Challenges / Data Migration

- Kubectl cp?
  - Is just tar piping under the hood

```
kubectl exec -it <pod_id> \
  tar -C /precious/files \
      --create \
      --listed-incremental=/path/to/backupIndex \
      -vv \
      --file=- . \
| tar -xvf - /precious/backups
```

- Rsync?
  - Sequential, single threaded

```
parallel -j 16 --eta rsync -aPhv {} destination/ ::: Downloads/*
```

  - Use fast storage (within k8s cluster) as cache
  - Split up into many tar files:

```
tar -cvp -f - /path/to/directory | split -b SIZE --numeric-suffixes - OUTPUT_PREFIX
```

Thank you!

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- State Pedagogical Institute Rhineland-Palatinate
- Krille
- Fluffychat Community
- Matrix Community