Database Lab 2: Bank Management System

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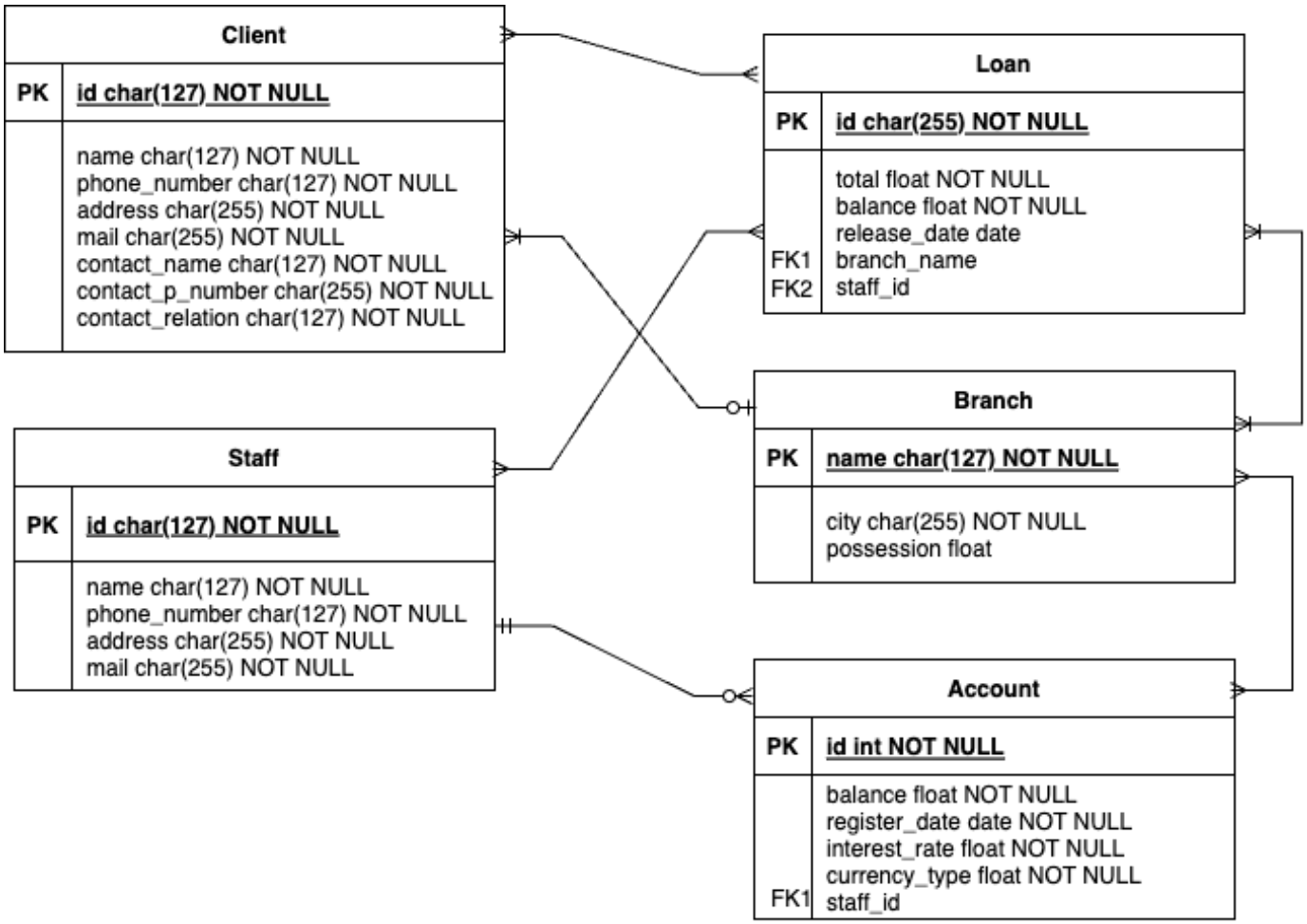
ER 图



架构设计

B / S 架构，前端使用 Vue3.js + Element Plus，后端使用 Django

数据生成与导入

以 account 为例，执行`python gen.py`生成 .csv 文件后执行 `python manage.py runscript insert`批量导入

```python
# gen.py
import faker
import random
```

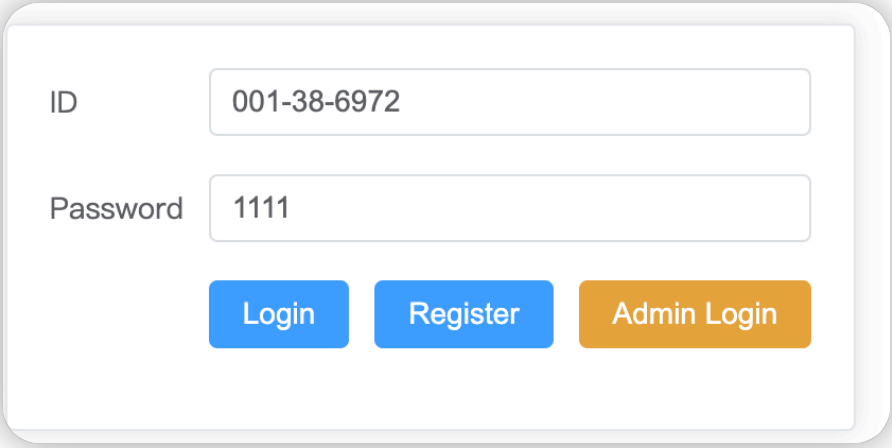
```
4
5  class Gen:
6      def __init__(self):
7          self.fake = faker.Faker(locale='ja_JP')
8
9      def account(self, num):
10         data = ""
11
12         staffs = ["173-25-1480", "067-84-8258", "141-66-1428", "652-98-
   0341", "718-98-9270"]
13
14         for _ in range(num):
15             id = str(self.fake.unique.random_int(min=100, max=999))
16             balance = float(random.randint(0, 1000000))
17             register_date =
   self.fake.date_time_between(start_date='-1y', end_date='now',
   tzinfo=None)
18             interest_rate = 1.02
19             currency_type = "JPY"
20             staff_id = staffs[random.randint(0, 4)]
21             data += f"{id},{balance},{register_date},{interest_rate},
   {currency_type},{staff_id}\n"
22
23         return data
24
25 if __name__ == "__main__":
26     g = Gen()
27
28     data = g.account(15)
29     with open("../../data/account.csv", "w") as f:
30         f.write(data)
```

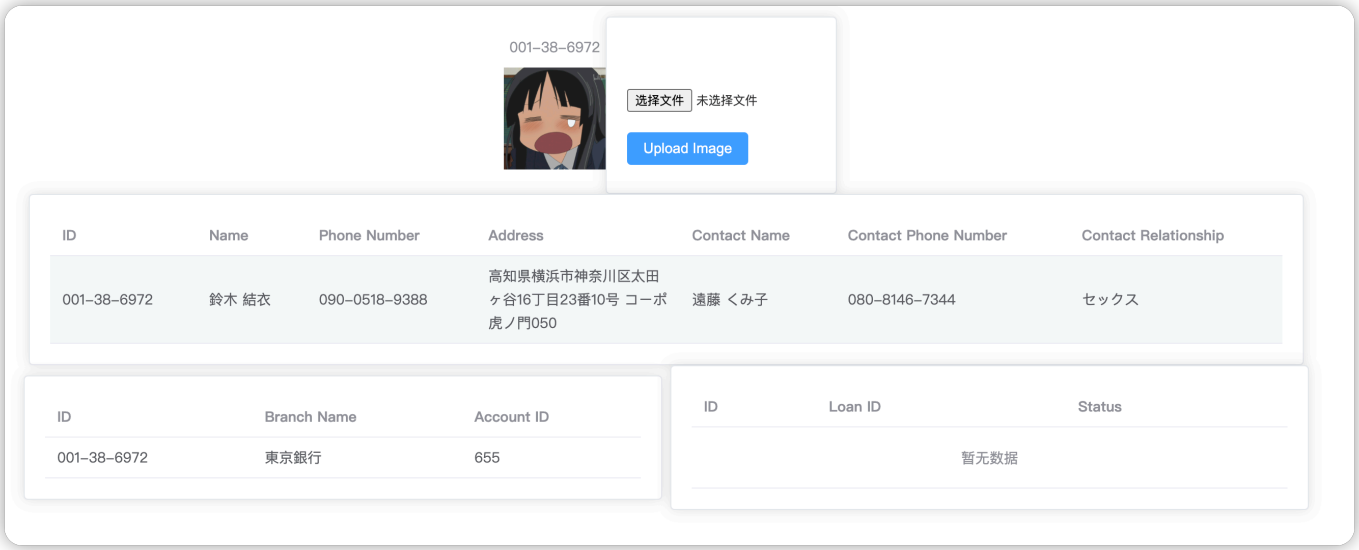
```
1  # insert.py
2  import pandas as pd
3  from api.models import *
4
5  def run():
6      # Insert account
7      data = pd.read_csv("account.csv", chunksize=15, header=None)
8      for items in data:
9          for item in items.values:
```

```
            obj = Account.objects.filter(id=item[0], balance=item[1], register_date=item[2], interest_rate=item[3], currency_type=item[4], staff_id=item[5])
            if not obj:
                staff = Staff.objects.get(id=item[5])
                o = Account.objects.create(id=item[0], balance=item[1], register_date=item[2], interest_rate=item[3], currency_type=item[4], staff_id=staff)
                o.save()
```

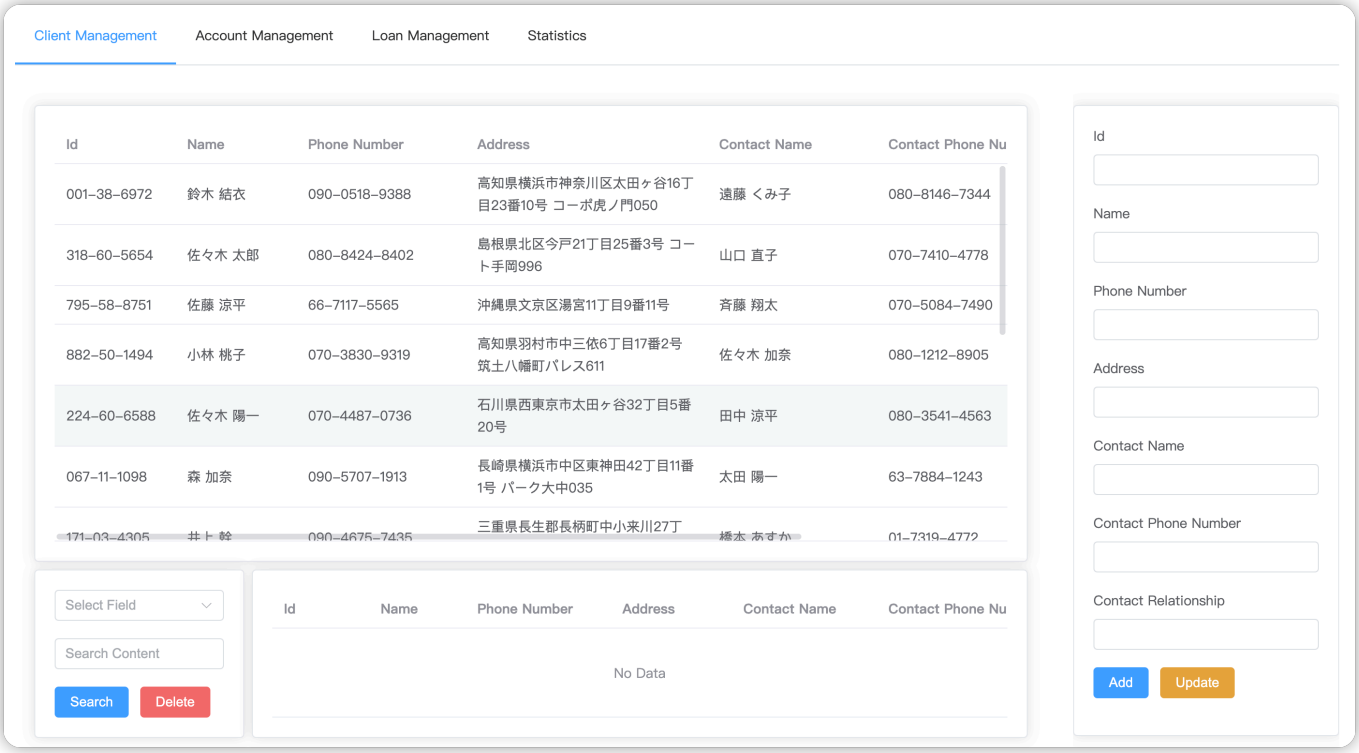
前端

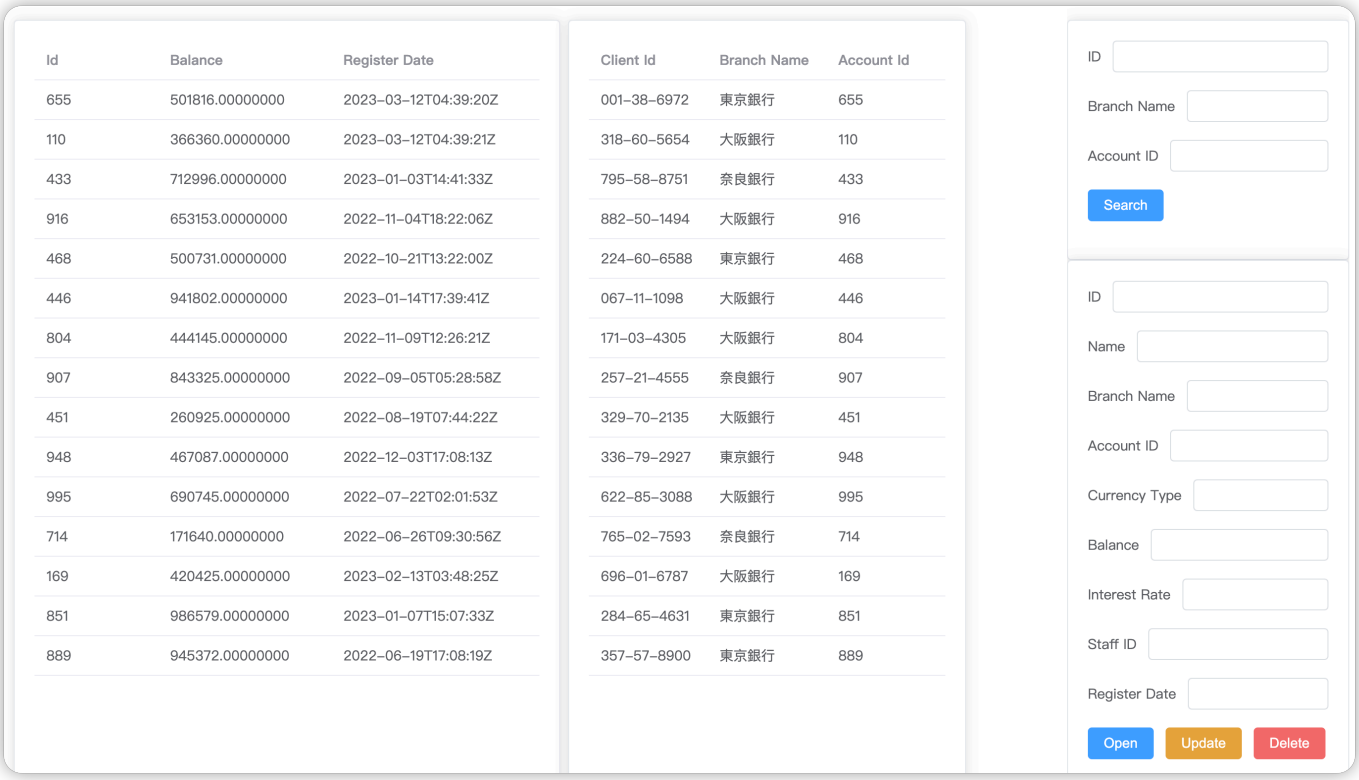
用户界面

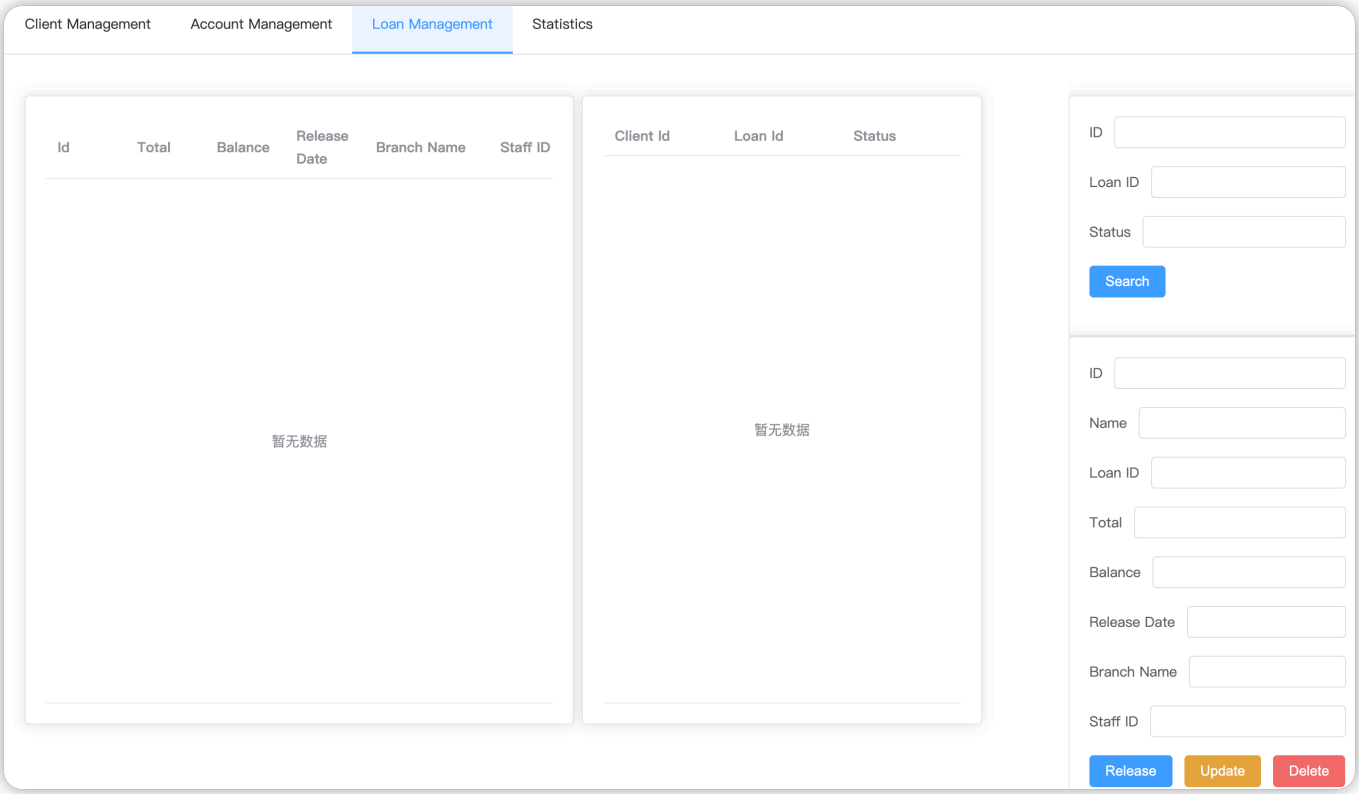


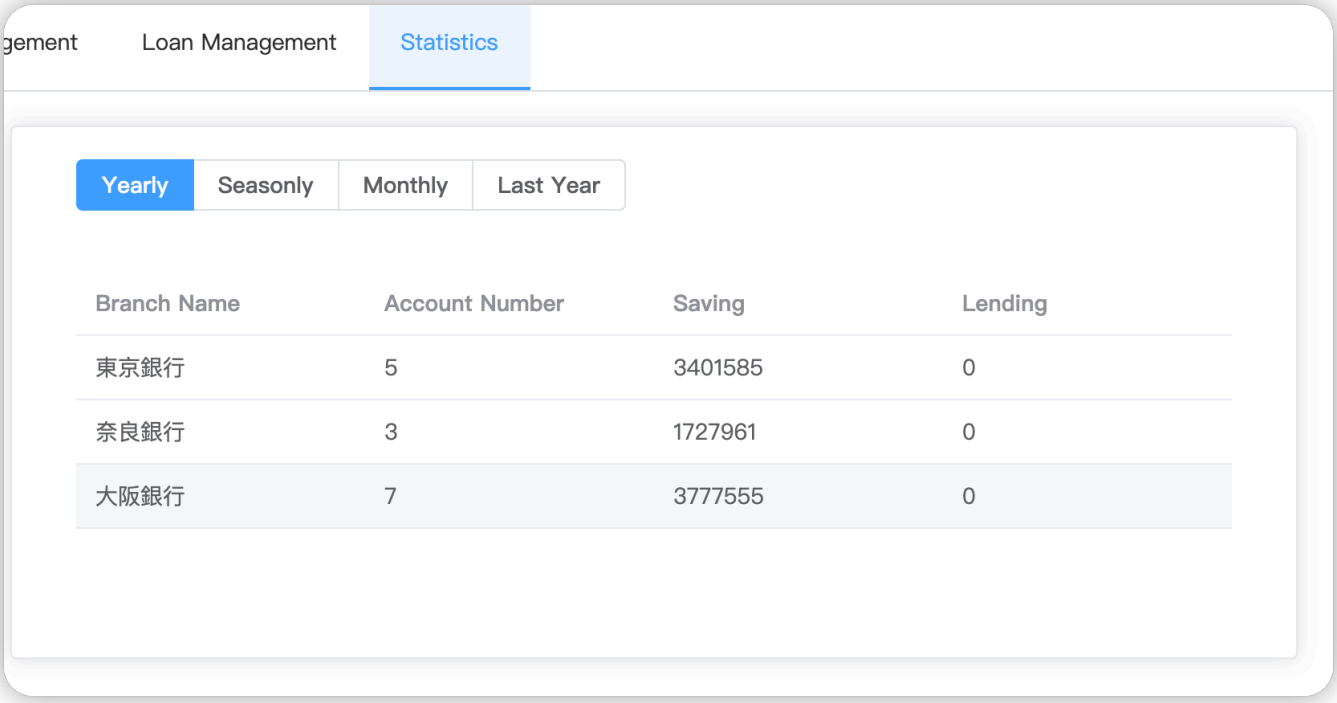


管理员界面


Client Management
Account Management
Loan Management
Statistics
Id
Name
Phone Number
Address
Contact Name
Contact Phone Nu
001–38–6972
鈴木 結衣
090–0518–9388
高知県横浜市神奈川区太田ヶ谷16丁目23番10号 コーポ虎ノ門050
遠藤 くみ子
080–8146–7344
318–60–5654
佐々木 太郎
080–8424–8402
島根県北区今戸21丁目25番3号 コート手岡996
山口 直子
070–7410–4778
795–58–8751
佐藤 涼平
66–7117–5565
沖縄県文京区湯宮11丁目9番11号
斉藤 翔太
070–5084–7490
882–50–1494
小林 桃子
070–3830–9319
高知県羽村市中三依6丁目17番2号 筑土八幡町パレス611
佐々木 加奈
080–1212–8905
224–60–6588
佐々木 陽一
070–4487–0736
石川県西東京市太田ヶ谷32丁目5番20号
田中 涼平
080–3541–4563
067–11–1098
森 加奈
090–5707–1913
長崎県横浜市中区東神田42丁目11番1号 パーク大中035
太田 陽一
63–7884–1243
Select Field
Search Content
Search
Delete
No Data
Id
Name
Phone Number
Address
Contact Name
Contact Relationship
Add
Update


Id
Balance
Register Date
655
501816.00000000
2023–03–12T04:39:20Z
110
366360.00000000
2023–03–12T04:39:21Z
433
712996.00000000
2023–01–03T14:41:33Z
916
653153.00000000
2022–11–04T18:22:06Z
468
500731.00000000
2022–10–21T13:22:00Z
446
941802.00000000
2023–01–14T17:39:41Z
804
444145.00000000
2022–11–09T12:26:21Z
907
843325.00000000
2022–09–05T05:28:58Z
451
260925.00000000
2022–08–19T07:44:22Z
948
467087.00000000
2022–12–03T17:08:13Z
995
690745.00000000
2022–07–22T02:01:53Z
714
171640.00000000
2022–06–26T09:30:56Z
169
420425.00000000
2023–02–13T03:48:25Z
851
986579.00000000
2023–01–07T15:07:33Z
889
945372.00000000
2022–06–19T17:08:19Z
Client Id
Branch Name
Account Id
001–38–6972
東京銀行
655
318–60–5654
大阪銀行
110
795–58–8751
奈良銀行
433
882–50–1494
大阪銀行
916
224–60–6588
東京銀行
468
067–11–1098
大阪銀行
446
171–03–4305
大阪銀行
804
257–21–4555
奈良銀行
907
329–70–2135
大阪銀行
451
336–79–2927
東京銀行
948
622–85–3088
大阪銀行
995
765–02–7593
奈良銀行
714
696–01–6787
大阪銀行
169
284–65–4631
東京銀行
851
357–57–8900
東京銀行
889
ID
Branch Name
Account ID
Search
ID
Name
Branch Name
Account ID
Currency Type
Balance
Interest Rate
Staff ID
Register Date
Open
Update
Delete


Client Management
Account Management
Loan Management
Statistics
Id
Total
Balance
Release Date
Branch Name
Staff ID
暂无数据
Client Id
Loan Id
Status
暂无数据
ID
Loan ID
Status
Search
ID
Name
Loan ID
Total
Balance
Release Date
Branch Name
Staff ID
Release
Update
Delete


gement
Loan Management
Statistics
Yearly
Seasonly
Monthly
Last Year
Branch Name
Account Number
Saving
Lending
東京銀行
5
3401585
0
奈良銀行
3
1727961
0
大阪銀行
7
3777555
0

后端

api

管理员接口

models.py

定义了类对应于数据库中的表，变量对应域。

例如 `Client` 类：

```
class Client(models.Model):
    id = models.CharField(max_length=127, primary_key=True)
    name = models.CharField(max_length=127, null=True, blank=True)
    phone_number = models.CharField(max_length=255, null=True, blank=True)
    address = models.CharField(max_length=255, null=True, blank=True)
    mail = models.CharField(max_length=255, null=True, blank=True)
    contact_name = models.CharField(max_length=127, null=True, blank=True)
    contact_phone_number = models.CharField(max_length=255, null=True, blank=True)
    contact_relationship = models.CharField(max_length=127, null=True, blank=True)

    def __str__(self):
        return f"{self.id} {self.name} {self.phone_number} {self.address} {self.mail} {self.contact_name} {self.contact_phone_number} {self.contact_relationship}"

```

serializers.py

定义了每个模型的`serializer`序列化程序允许将查询集和模型实例等复杂数据转换为原生 Python 数据类型，然后可以轻松将其呈现为 JSON、XML 或其他内容类型：

```
ClientSerializer = ClientSerializer()
ClientSerializer.data
# {'id': '001-38-6972', 'name': '鈴木 結衣', ...}
```

views.py

定义了每一个接口及接口功能。对于每个模型都建立了 ViewSet ，它默认提供 CRUD 的功能。可以重写这些方法或编写自定义的操作。

例如 `ClientViewSet` 视图集，它继承自`rest_framework.viewsets.ModelViewSet`，使用`ClientSerializer`作为序列化器，查询所用的域是`id`：

```python
class ClientViewSet(viewsets.ModelViewSet) :
    queryset = Client.objects.all()
    serializer_class = ClientSerializer
    lookup_field = 'id'

     @transaction.atomic
    def destroy(self, request, *args, **kwargs):
        client = self.get_object()

        foo = transaction.savepoint()

        try:
            client.delete()
        except :
            try:
                client_branch = Client_Branch.objects.get(client_id=client.id)
            except Client_Branch.DoesNotExist:
                transaction.savepoint_rollback(foo)
                return Response(status=status.HTTP_400_BAD_REQUEST, data='Client_Branch does not exist')

            client_branch.delete()
            client.delete()
            transaction.savepoint_commit(foo)
            return Response(status=status.HTTP_204_NO_CONTENT)

        transaction.savepoint_commit(foo)
        return Response(status=status.HTTP_204_NO_CONTENT)
```

`destory` 函数重写了`delete`方法，这样可以实现先删除外键再删除自身。也可以对可能出现的异常给出相应。

urls.py

使用 `ViewSet` 生成默认路由：

```python
from . import views
from rest_framework.routers import DefaultRouter

router = DefaultRouter()
router.register('client', views.ClientViewSet)
router.register('staff', views.StaffViewSet)
```

```
router.register('branch', views.BranchViewSet)
router.register('account', views.AccountViewSet)
router.register('loan', views.LoanViewSet)
router.register('client_loan', views.ClientLoanViewSet)
router.register('client_branch', views.ClientBranchViewSet)

app_name = 'api'
urlpatterns = []
urlpatterns += router.urls
```

register

用户接口

models.py

定义了访问用户，除用户名密码域外还支持用户头像的上传：

```
from django.db import models
from PIL import Image

# Create your models here.

class User(models.Model):
    id = models.CharField(max_length=127, primary_key=True)
    passwd = models.CharField(max_length=127)
    photo = models.ImageField(upload_to='pics', null=True, blank=True)

    def save(self):
        super().save()
        img = Image.open(self.photo.path)
        # resize
        if img.height > 300 or img.width > 300:
            output_size = (300,300)
            img.thumbnail(output_size)
            img.save(self.photo.path)
```

views.py

简单的注册登录和上传图片方法，使用`request.FILES.get('image')`得到待上传的图片文件：

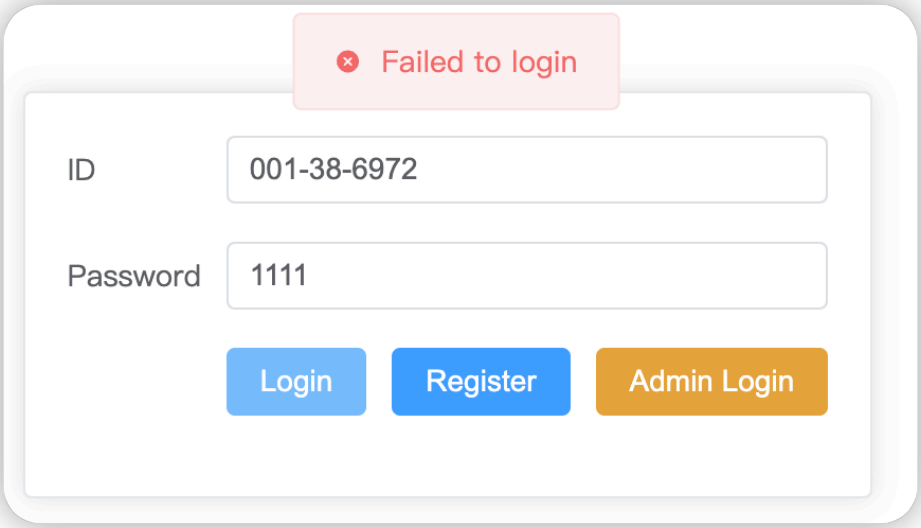
```python
from rest_framework import status
from rest_framework import viewsets
from rest_framework.decorators import action
from rest_framework.response import Response

from django.db import transaction

from .serializers import *
# Create your views here.

class UserViewSet(viewsets.ModelViewSet):
    queryset = User.objects.all()
    serializer_class = UserSerializer
    lookup_field = 'id'

    @action(detail=False, methods=['post'])
    @transaction.atomic
    def register(self, request):
        serializer = UserSerializer(data=request.data)
        if serializer.is_valid():
            try:
                with transaction.atomic():
                    user = serializer.save()
                    user.save()
                    return Response(serializer.data,
status=status.HTTP_201_CREATED)
            except:
                return Response({'error': 'Username already exists.'},
status=status.HTTP_409_CONFLICT)
        return Response(serializer.errors,
status=status.HTTP_400_BAD_REQUEST)

    @action(detail=False, methods=['post'])
    def login(self, request):
        id = request.data.get('id')
        passwd = request.data.get('passwd')

        try:
            user = User.objects.get(id=id, passwd=passwd)
        except user.DoesNotExist:
            return Response({'message': 'Invalid credentials'},
status=status.HTTP_401_UNAUTHORIZED)

```

```
        return Response(status=status.HTTP_200_OK)

    @action(detail=False, methods=['post'])
    def uploadImage(self, request):
        id = request.data.get('id')
        image = request.FILES.get('image')
        user = User.objects.get(id=id)
        user.photo = image
        user.save()
        return Response({'message': 'Image uploaded successfully'},
status=status.HTTP_200_OK)

```

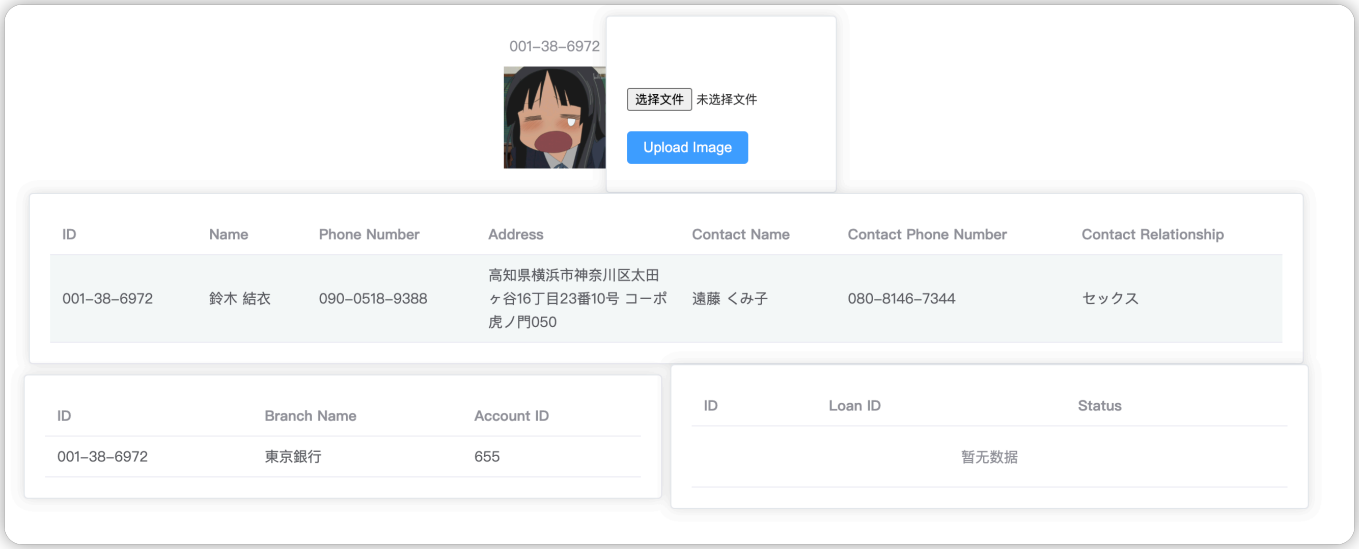
运行测试

用户登录

输入错误密码显示登录错误



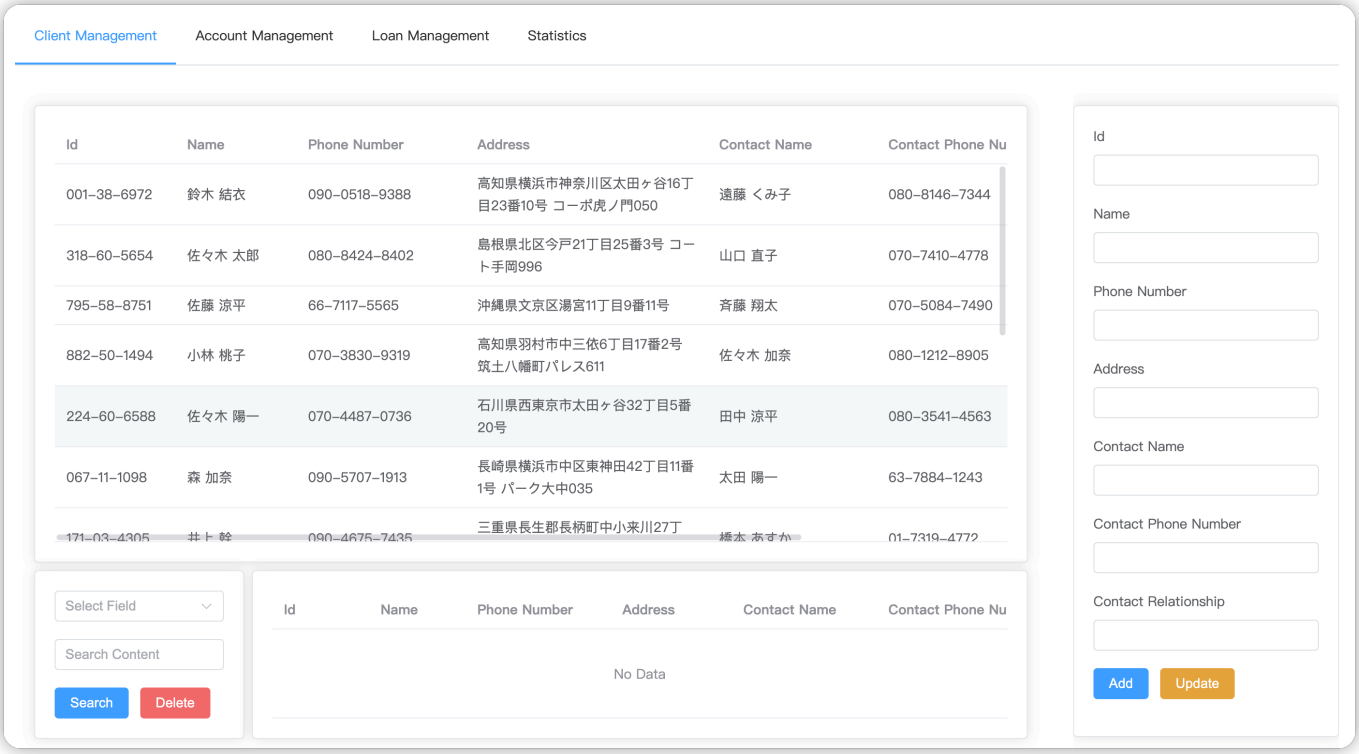
输入正确密码显示登录正确并跳转到用户主页



主页显示有用户个人信息 可以上传图片作为主页图片

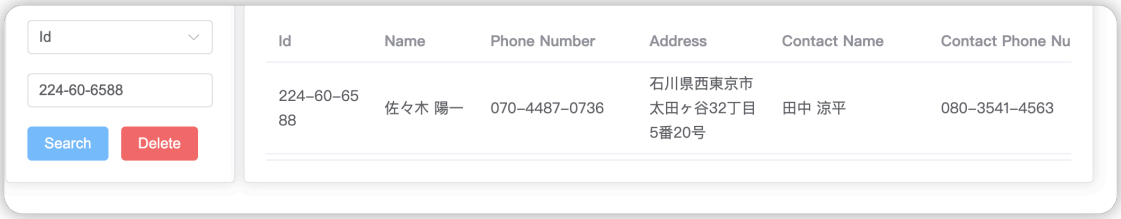
管理员登录

点击 Admin Login即可跳转到管理员界面

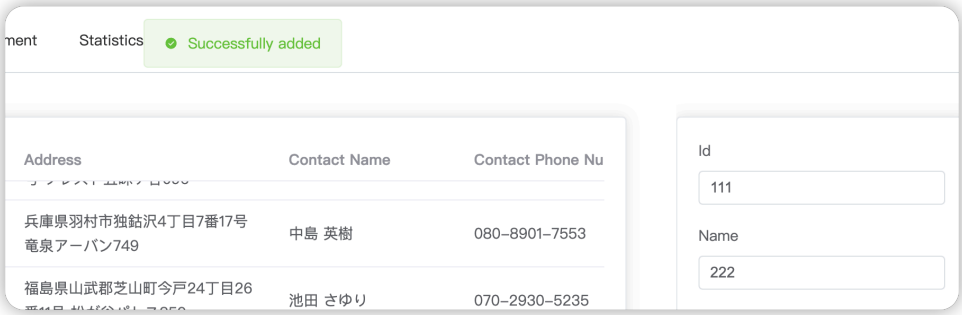


CRUD

查询Id = 224-60-6588 的用户，会在查询栏返回查询结果

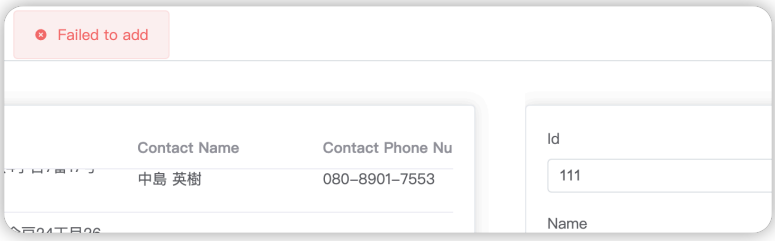


添加一个 Id 为 111 Name 为 222 的用户

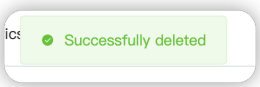


页面刷新后可以看到用户已在列表中

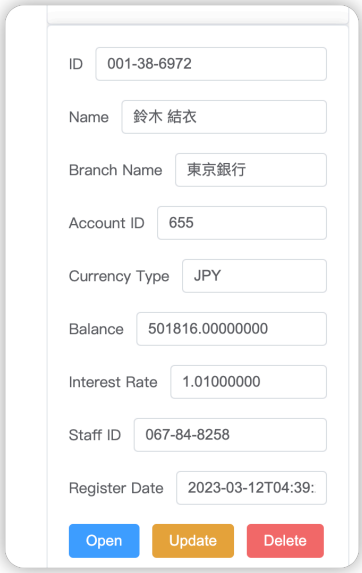
再次添加显示添加错误

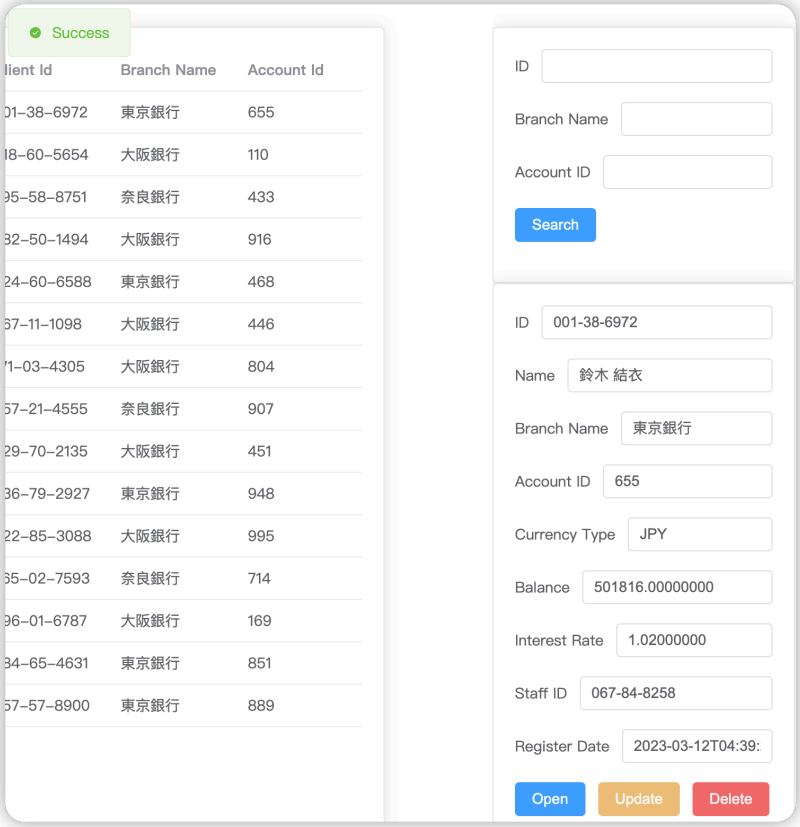


搜索框输入 111，点击删除按钮，删除 Id 为 111 的用户



切换到账户管理，更新 Id = 665 账户的利率

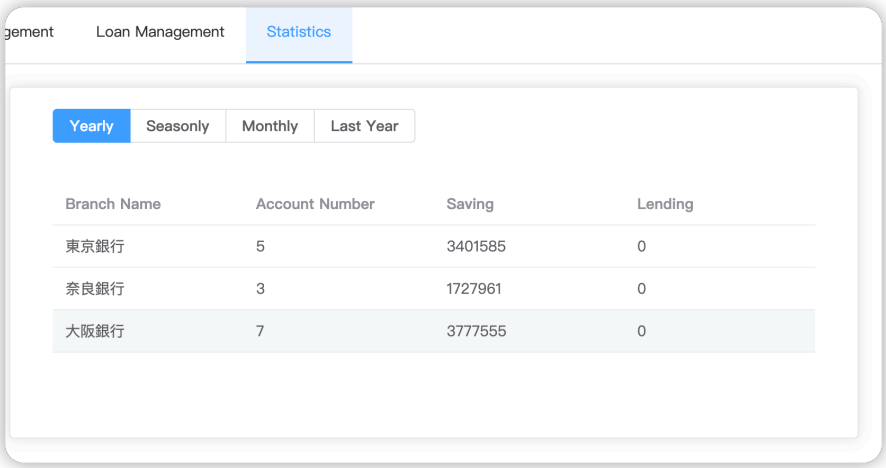




由于 Loan 实现逻辑与 Client 基本一致因此不做展示。

数据统计

可以统计年、季度、月份、上一年的数据



不足与展望

由于时间关系还未完成用户界面对后端数据库 CRUD 操作；用户登录注册只实现了最基本的部分，缺少密码强度检查、自动填充、验证码、修改密码等机制；后端没有添加管理员认证（实际上 Django 后端已经给出了写好的 admin 界面，但界面不够优雅且缺少可扩展性）存在安全性问题。