Dokumentasi Backend Pembayaran SPP

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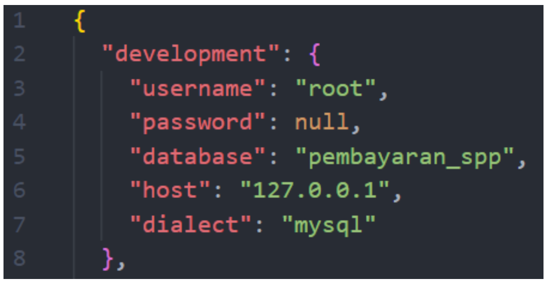
Pembuatan Backend

Dalam proses pembuatan project pembayaran-spp ini kita akan mulai dengan pembuatan bagian backend atau pengolahan datanya terlebih dahulu. Disini saya menggunakan expressjs sebagai backend, mysql sebagai database, sequelize sebagai ORM (menghubungkan coding dengan database), dan XAMPP sebagai servernya

I. Persiapan awal

1. Membuat database dengan nama **pembayaran_spp.**
2. Membuat folder project **pembayaran_spp.**
3. Membuat folder **backend** dan **router** (nantinya ada 2 folder, backend dan frontend).
4. Masuk kedalam folder backend dan lakukan inisiasi `npm init --y`
5. Membuat file dengan nama **server.js**
6. Lakukan instalasi dependencies yang diperlukan. Disini saya menginstal, antara lain: `npm install sequelize express mysql2 nodemon`

7. Atur *nodemon*, Masuk ke **package.json** dan tambahkan **"start": "nodemon server.js"** pada bagian **scripts**.
8. konfigurasi database pada **config \ config.js** seperti gambar dibawah.



```
{
  "development": {
    "username": "root",
    "password": null,
    "database": "pembayaran_spp",
    "host": "127.0.0.1",
    "dialect": "mysql"
  },
```

II. Create Migrations

1. Inisiasi sequelize dengan `sequelize init`
2. membuat migration model tabelnya. Sebagai berikut:

spp

```
sequelize model:create --name spp --attributes
tahun:integer,nominal:integer
```

kelas

```
sequelize model:create --name kelas --attributes
nama_kelas:string,kompetensi_keahlian:string
```

petugas

```
sequelize model:create --name petugas --attributes
username:string,password:string,nama_petugas:string,level:enum
```

siswa

```
sequelize model:create --name siswa --attributes
nis:char,nama:string,id_kelas:integer,alamat:text,no_telp:string,i d_spp:integer
```

pembayaran

```
sequelize model:create --name pembayaran --attributes
id_petugas:integer,nisn:integer,tgl_bayar:date,bulan_dibayar:strin
g,tahun_dibayar:string,id_spp:integer,jumlah_bayar:integer
```

***Lakukan pembuatan model diatas secara berurutan agar tidak terjadi error**

III. Relation Migrations

Untuk membuat tabel berelasi.

1. Mengubah data **migrations** sesuai kode dibawah:

Create-spp.js

```
'use strict';
module.exports = {
  up: async (queryInterface, Sequelize) => {
    await queryInterface.createTable('spp', {
      id_spp: {
        allowNull: false,
        autoIncrement: true,
        primaryKey: true,
        type: Sequelize.INTEGER
      },
      tahun: {
        type: Sequelize.INTEGER
      },
      nominal: {
        type: Sequelize.INTEGER
      },
      createdAt: {
        allowNull: false,
        type: Sequelize.DATE
      },
      updatedAt: {
        allowNull: false,
        type: Sequelize.DATE
      }
    });
  },
  down: async (queryInterface, Sequelize) => {
    await queryInterface.dropTable('spp');
  }
};
```

create-kelas.js

```
module.exports = {
  up: async (queryInterface, Sequelize) => {
    await queryInterface.createTable('kelas', {
      id_kelas: {
        allowNull: false,
        autoIncrement: true,
        primaryKey: true,
        type: Sequelize.INTEGER
      },
      nama_kelas: {
        type: Sequelize.STRING
      },
      kompetensi_keahlian: {
        type: Sequelize.STRING
      },
      createdAt: {
        allowNull: false,
        type: Sequelize.DATE
      },
      updatedAt: {
        allowNull: false,
        type: Sequelize.DATE
      }
    });
  },
  down: async (queryInterface, Sequelize) => {
    await queryInterface.dropTable('kelas');
  }
};
```

create-petugas.js

```
'use strict';
module.exports = {
  up: async (queryInterface, Sequelize) => {
    await queryInterface.createTable('petugas', {
      id_petugas: {
        allowNull: false,
        autoIncrement: true,
        primaryKey: true,
        type: Sequelize.INTEGER
      },
      username: {
        type: Sequelize.STRING
      },
      password: {
        type: Sequelize.STRING
      },
      nama_petugas: {
        type: Sequelize.STRING
      },
      level: {
```

```
type: Sequelize.ENUM('admin','petugas')
      },
      createdAt: {
        allowNull: false,
        type: Sequelize.DATE
      },
      updatedAt: {
        allowNull: false,
        type: Sequelize.DATE
      }
    });
  },
  down: async (queryInterface, Sequelize) => {
    await queryInterface.dropTable('petugas');
  }
};
```

create-siswa.js

```
'use strict';
module.exports = {
  up: async (queryInterface, Sequelize) => {
    await queryInterface.createTable('siswa', {
      nisn: {
        allowNull: false,
        autoIncrement: true,
        primaryKey: true,
        type: Sequelize.INTEGER
      },
      nis: {
        type: Sequelize.CHAR
      },
      nama: {
        type: Sequelize.STRING
      },
      id_kelas: {
        type: Sequelize.INTEGER,
        allowNull: false,
        references: {
          model: "kelas",
          key: "id_kelas"
        }
      },
      alamat: {
        type: Sequelize.TEXT
      },
      no_telp: {
        type: Sequelize.STRING
      },
      id_spp: {
        type: Sequelize.INTEGER,
        allowNull: false,
        references: {
          model: "spp",
          key: "id_spp"
        }
      },
      createdAt: {
        allowNull: false,
        type: Sequelize.DATE
      },
      updatedAt: {
        allowNull: false,
        type: Sequelize.DATE
      }
    });
  },
  down: async (queryInterface, Sequelize) => {
    await queryInterface.dropTable('siswa');
  }
};
```

create-pembayaran.js

```
'use strict';
module.exports = {
  up: async (queryInterface, Sequelize) => {
    await queryInterface.createTable('pembayaran', {
      id_pembayaran: {
        allowNull: false,
        autoIncrement: true,
        primaryKey: true,
        type: Sequelize.INTEGER
      },
      id_petugas: {
        type: Sequelize.INTEGER,
        allowNull: false,
        references: {
          model: "petugas",
          key: "id_petugas"
        }
      },
      nisn: {
        type: Sequelize.INTEGER,
        allowNull: false,
        references: {
          model: "siswa",
          key: "nisn"
        }
      },
      tgl_bayar: {
        type: Sequelize.DATE
      },
bulan_dibayar: {
        type: Sequelize.STRING
      },
      tahun_dibayar: {
        type: Sequelize.STRING
      },
      id_spp: {
        type: Sequelize.INTEGER,
        allowNull: false,
        references: {
          model: "spp",
          key: "id_spp"
        }
      },
      jumlah_bayar: {
        type: Sequelize.INTEGER
      },
      createdAt: {
        allowNull: false,
        type: Sequelize.DATE
      },
      updatedAt: {
        allowNull: false,
        type: Sequelize.DATE
      }
    });
  },
  down: async (queryInterface, Sequelize) => {
    await queryInterface.dropTable('pembayaran');
  }
};
```

2. Setelah selesai konfigurasi **relation.** Jalankan `sequelize db:migrate`

IV. Konfigurasi Models

Konfigurasi models ini bertujuan sebagai jembatan antara nodejs dengan database.

1. Mengubah data **models** seperti dibawah ini:

spp.js

```
class spp extends Model {
    static associate(models) {
      // define association here
      this.hasMany(models.siswa, {
        foreignKey: "id_spp",
        as: "siswa"
      })

      this.hasMany(models.pembayaran, {
        foreignKey: "id_spp",
        as: "pembayaran"
      })
    }
  };
  spp.init({
    id_spp: {
      type: DataTypes.INTEGER,
      allowNull: false,
      primaryKey: true,
      autoIncrement: true
    },
    tahun: DataTypes.INTEGER,
    nominal: DataTypes.INTEGER
  }, {
    sequelize,
    modelName: 'spp',
    tableName: 'spp'
  });
```

kelas.js

```
class kelas extends Model {
    static associate(models) {
      // define association here
      this.hasMany(models.siswa, {
        foreignKey: "id_kelas",
        as: "siswa"
      })
    }
  };
  kelas.init({
    id_kelas: {
      type: DataTypes.INTEGER,
      allowNull: false,
      primaryKey: true,
      autoIncrement: true
    },
    nama_kelas: DataTypes.STRING,
    kompetensi_keahlian: DataTypes.STRING
  }, {
    sequelize,
    modelName: 'kelas',
    tableName: 'kelas'
  });
```

petugas.js

```
class petugas extends Model {
    static associate(models) {
      // define association here
      this.hasMany(models.pembayaran, {
        foreignKey: "id_petugas",
        as: "pembayaran"
      })
    }
  };
  petugas.init({
    id_petugas: {
      type: DataTypes.INTEGER,
      allowNull: false,
      primaryKey: true,
      autoIncrement: true
    },
    username: DataTypes.STRING,
    password: DataTypes.STRING,
    nama_petugas: DataTypes.STRING,
    level: DataTypes.ENUM('admin','petugas')
  }, {
    sequelize,
    modelName: 'petugas',
    tableName: 'petugas'
  });
```

siswa.js

```
class siswa extends Model {
    static associate(models) {
      // define association here
      this.belongsTo(models.spp, {
        foreignKey: "id_spp",
        as: "spp"
      })

      this.belongsTo(models.kelas, {
        foreignKey: "id_kelas",
        as: "kelas"
      })

      this.hasMany(models.pembayaran, {
        foreignKey: "nisn",
        as: "pembayaran"
      })
    }
  };
  siswa.init({
    nisn: {
      type: DataTypes.INTEGER,
      allowNull: false,
      primaryKey: true
    },
    nis: DataTypes.CHAR,
    nama: DataTypes.STRING,
    id_kelas: DataTypes.INTEGER,
    alamat: DataTypes.TEXT,
    no_telp: DataTypes.STRING,
    id_spp: DataTypes.INTEGER
  }, {
    sequelize,
    modelName: 'siswa',
    tableName: 'siswa'
  });
```

pembayaran.js

```
class pembayaran extends Model {
    static associate(models) {
      // define association here
      this.belongsTo(models.petugas, {
        foreignKey: "id_petugas",
        as: "petugas"
      })

      this.belongsTo(models.siswa, {
        foreignKey: "nisn",
        as: "siswa"
      })

      this.belongsTo(models.spp, {
        foreignKey: "id_spp",
        as: "spp"
      })
    }
  };
  pembayaran.init({
    id_pembayaran: {
      type: DataTypes.INTEGER,
      allowNull: false,
      primaryKey: true,
      autoIncrement: true
    },
    id_petugas: DataTypes.INTEGER,
    nisn: DataTypes.STRING,
    tgl_bayar: DataTypes.DATE,
    bulan_dibayar: DataTypes.STRING,
    tahun_dibayar: DataTypes.STRING,
    id_spp: DataTypes.INTEGER,
    jumlah_bayar: DataTypes.INTEGER
  }, {
    sequelize,
    modelName: 'pembayaran',
    tableName: 'pembayaran'
  });
```

V. Pembuatan Endpoint API

Pembuatab API ini bertujuan sebagai jembatan penghubung client/user dengan bagian backend

1. Di dalam folder router buat 7 file baru yaitu: **spp.js, siswa.js, petugas.js, pembayaran.js, kelas.js, auth.js, auth_verify.js.** Lalu tambahkan coding pada masing masing file sebagai berikut

spp.js

```
const express = require("express")
const app = express()

// call model
const spp = require("../models/index").spp

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

// auth_verify
const verify = require("./auth_verify")
app.use(verify)

// get data
app.get("/", async(req,res) => {
    spp.findAll({include:[{ all: true, nested: true }]})
    .then(result => {
        res.json({
            message: "Data founded",
            spp: result,
            found: true
        })
    })
    .catch(error => {
        res.json({
            message: error.message,
            found: true
        })
    })
})

// add data
app.post("/", async(req,res) => {
    // put data
    let data = {
        tahun: req.body.tahun,
        nominal: req.body.nominal
    }
    spp.create(data)
    .then(result => {
        res.json({
            message: "Data inserted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// update data
app.put("/", async(req,res) => {
    // put data
    let data = {
        tahun: req.body.tahun,
        nominal: req.body.nominal
    }

    let param = {
        id_spp: req.body.id_spp
    }

    spp.update(data, {where: param})
    .then(result => {
        res.json({
            message: "Data updated",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// delete data
app.delete("/:id_spp", async(req,res) => {
    // put data
    let param = {
        id_spp: req.params.id_spp
    }

    spp.destroy({where: param})
    .then(result => {
        res.json({
            message: "Data deleted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

module.exports = app
```

kelas.js

```
const express = require("express")
const app = express()

// call model
const kelas = require("../models/index").kelas

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

// auth_verify
const verify = require("./auth_verify")
app.use(verify)

// get data
app.get("/", async(req,res) => {
    kelas.findAll({include:[{ all: true, nested: true }]})
    .then(result => {
        res.json({
            message: "Data founded",
            kelas: result,
            found: true
        })
    })
    .catch(error => {
        res.json({
            message: error.message,
            found: true
        })
    })
})

// add data
app.post("/", async(req,res) => {
    // put data
    let data = {
        nama_kelas: req.body.nama_kelas,
        kompetensi_keahlian: req.body.kompetensi_keahlian
    }

    kelas.create(data)
    .then(result => {
        res.json({
            message: "Data inserted",
            data: result
        })
    })
.catch(error => {
        res.json({
            message: error.message
        })
    })
})

// update data
app.put("/", async(req,res) => {
    // put data
    let data = {
        nama_kelas: req.body.nama_kelas,
        kompetensi_keahlian: req.body.kompetensi_keahlian
    }

    let param = {
        id_kelas: req.body.id_kelas
    }

    kelas.update(data, {where: param})
    .then(result => {
        res.json({
            message: "Data updated",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// delete data
app.delete("/:id_kelas", async(req,res) => {
    // put data
    let param = {
        id_kelas: req.params.id_kelas
    }

    kelas.destroy({where: param})
    .then(result => {
        res.json({
            message: "Data deleted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})
```

```
module.exports = app;
```

petugas.js

```
const express = require("express")
const app = express()
var md5 = require('md5');

// call model
const petugas = require("../models/index").petugas

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

// auth_verify
const verify = require("./auth_verify")
app.use(verify)

// get data
app.get("/", async(req,res) => {
    petugas.findAll({include:[{ all: true, nested: true }]})
    .then(result => {
        res.json({
            petugas: result,
            found: true
        })
    })
    .catch(error => {
        res.json({
            message: error.message,
            found: false
        })
    })
})

// add data
app.post("/", async(req,res) => {
    // put data
    let data = {
        username: req.body.username,
        nama_petugas: req.body.nama_petugas,
        level: req.body.level,
        password: md5(req.body.password)
    }
```

```
 petugas.create(data)
    .then(result => {
        res.json({
            message: "Data inserted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// update data
app.put("/", async(req,res) => {
    // put data
    let data = {
        username: req.body.username,
        nama_petugas: req.body.nama_petugas,
        level: req.body.level
    }

    let param = {
        id_petugas: req.body.id_petugas
    }

    if(req.body.password){
        data.password = md5(req.body.password)
    }

    petugas.update(data, {where: param})
    .then(result => {
        res.json({
            message: "Data updated",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// delete data
app.delete("/:id_petugas", async(req,res) => {
    // put data
    let param = {
        id_petugas: req.params.id_petugas
    }
    petugas.destroy({where: param})
    .then(result => {
        res.json({
            message: "Data deleted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

module.exports = app;
```

siswa.js

```
const express = require("express")
const app = express()

// call model
const siswa = require("../models/index").siswa

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

// get data by NISN
app.get("/:nisn", async(req,res) => {
    let nisn = {
        nisn: req.params.nisn
    }

    siswa.findOne({where: nisn, include:[{ all: true, nested: true }]})
    .then(result => {
        if(result){
            res.json({
                message: "Data founded",
                data_siswa: result,
                found: true
            })
        } else {
            res.json({
                message: "Data not found",
                found: false
            })
        }
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// auth_verify
const verify = require("./auth_verify")
app.use(verify)
```

```
// get data
app.get("/", async(req,res) => {
    siswa.findAll({include:[{ all: true, nested: true }]})
    .then(result => {
        res.json({
            message: "Data founded",
            siswa: result,
            found: true
        })
    })
    .catch(error => {
        res.json({
            message: error.message,
            found: false
        })
    })
})



// add data
app.post("/", async(req,res) => {
    // put data
    let data = {
        nisn: req.body.nisn,
        nis: req.body.nis,
        nama: req.body.nama,
        id_kelas: req.body.id_kelas,
        alamat: req.body.alamat,
        no_telp: req.body.no_telp,
        id_spp: req.body.id_spp
    }

    siswa.create(data)
    .then(result => {
        res.json({
            message: "Data inserted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// update data
app.put("/", async(req,res) => {
    // put data
    let data = {
        nis: req.body.nis,
        nama: req.body.nama,
        id_kelas: req.body.id_kelas,
        alamat: req.body.alamat,
        no_telp: req.body.no_telp,
        id_spp: req.body.id_spp
    }

    let param = {
        nisn: req.body.nisn
    }

    siswa.update(data, {where: param})
    .then(result => {
        res.json({
            message: "Data updated",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// delete data
app.delete("/:nisn", async(req,res) => {
    // put data
    let param = {
        nisn: req.params.nisn
    }

    siswa.destroy({where: param})
    .then(result => {
        res.json({
            message: "Data deleted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

module.exports = app;
```

pembayaran.js

```
const express = require("express")
const app = express()

// call model
const pembayaran = require("../models/index").pembayaran

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

// auth_verify
const verify = require("./auth_verify")
app.use(verify)

// get data
app.get("/", async(req,res) => {
    pembayaran.findAll({include:[{ all: true, nested: true }]})
    .then(result => {
        res.json({
            pembayaran: result,
            found: true
        })
    })
    .catch(error => {
        res.json({
            message: error.message,
            found: false
        })
    })
})

// add data
app.post("/", async(req,res) => {
    // put data
    let data = {
        id_petugas: req.body.id_petugas,
        nisn: req.body.nisn,
        tgl_bayar: req.body.tgl_bayar,
        bulan_dibayar: req.body.bulan_dibayar,
        tahun_dibayar: req.body.tahun_dibayar,
        id_spp: req.body.id_spp,
        jumlah_bayar: req.body.jumlah_bayar
    }
```

```javascript
pembayaran.create(data)
    .then(result => {
        res.json({
            message: "Data inserted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// update data
app.put("/", async(req,res) => {
    // put data
    let data = {
        id_petugas: req.body.id_petugas,
        nisn: req.body.nisn,
        tgl_bayar: req.body.tgl_bayar,
        bulan_dibayar: req.body.bulan_dibayar,
        tahun_dibayar: req.body.tahun_dibayar,
        id_spp: req.body.id_spp,
        jumlah_bayar: req.body.jumlah_bayar
    }

    let param = {
        id_pembayaran: req.body.id_pembayaran
    }

    pembayaran.update(data, {where: param})
    .then(result => {
        res.json({
            message: "Data updated",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

// delete data
app.delete("/:id_pembayaran", async(req,res) => {
    // put data
    let param = {
        id_pembayaran: req.params.id_pembayaran
    }

    pembayaran.destroy({where: param})
    .then(result => {
        res.json({
            message: "Data deleted",
            data: result
        })
    })
    .catch(error => {
        res.json({
            message: error.message
        })
    })
})

module.exports = app;
```

auth.js

```
const express = require('express')
const app = express()
const jwt = require('jsonwebtoken')
const md5 = require('md5')

// call model
const petugas = require("../models/index").petugas

// allow request body
app.use(express.urlencoded({extended:true}))
app.use(express.json())

app.post('/', async (req,res) => {
    // put data
    let data = {
        username: req.body.username,
        password: md5(req.body.password),
        level: req.body.level
    }

    // let exp = {
    //     expToken: req.body.expToken
    // }

    // put result
    let result = await petugas.findOne({where:data})

    if(result === null){
        res.json({
            message: "invalid username or password or level",
            logged: false
        })
} else {
        // jwt
        let jwtHeader = {
            algorithm: "HS256",
            // expiresIn: exp.expToken // 1s 1h 1d 1w 1y
        }

        let payload = {
            data: result
        }

        let secretKey = "koala"

        let token = jwt.sign(payload, secretKey, jwtHeader)
        res.json({
            data: result,
            token: token,
            logged: true
        })
    }
})

module.exports = app
```

auth_verify.js

```javascript
const jwt = require("jsonwebtoken")

auth_verify = (req, res, next) => {
    // get jwt from header
    let header = req.headers.authorization
    let token = null

    if(header != null){
        // get token from second side
        token = header.split(" ")[1]
    }

    if(token == null){
        res.json({
            message: "unauthorized"
        })
    } else {
        // jwt
        let jwtHeader = {
            algorithm: "HS256"
        }

        let secretKey = "koala"

        jwt.verify(token, secretKey, jwtHeader, err => {
            if(err){
                res.json({
                    message: "Invalid or expired token",
                    Token: token
                })
            }else{
                next()
            }
        })
    }
}

module.exports = auth_verify
```

2. Setelah selesai membuat Router API-nya. Sekarang saatnya membuat gerbangnya untuk dapat dijalankan sesuai dengan kebutuhan user dari frontend. Buka file **server.js** dan isikan script dibawah ini:

server.js

```
const express = require('express')
const app = express()

/*
Access to XMLHttpRequest at 'http://localhost:8000/auth' from origin
'http://localhost:3000' has been blocked by CORS policy: Response to
preflight request doesn't pass access control check: No
'Access-Control-Allow-Origin' header is present on the requested resource.
*/
var cors = require('cors')
app.use(cors())

app.use(express.static(__dirname))

// router
const kelas = require("./router/kelas")
const spp = require("./router/spp")
const siswa = require("./router/siswa")
const petugas = require("./router/petugas")
const pembayaran = require("./router/pembayaran")
const auth = require("./router/auth")

app.use("/auth", auth)
app.use("/kelas", kelas)
app.use("/spp", spp)
app.use("/siswa", siswa)
app.use("/petugas", petugas)
app.use("/pembayaran", pembayaran)

app.listen(8000, () => {
    console.log("Server run on 8000")
})
```

VI. Finish

Selamat kamu sudah selesai membuat backend dari nodejs dibantu dengan framework expressjs dan sequelize. Kita bisa mencoba endpoint API yang sudah dibuat dengan menggunakan **POSTMAN.**