

LAPORAN PRAKTIKUM
POSTTEST 6
ALGORITMA PEMROGRAMAN LANJUT

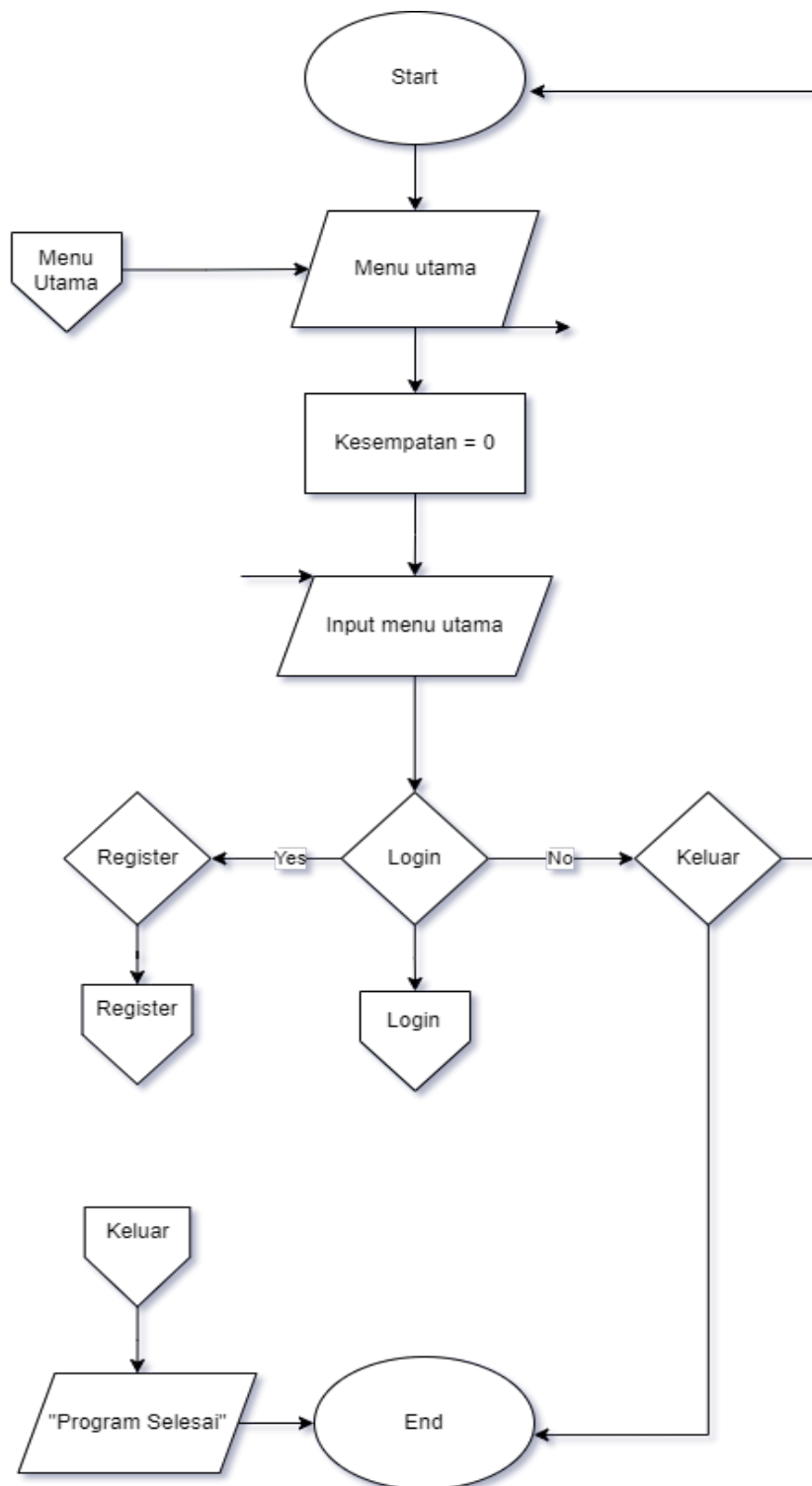


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PROGRAM STUDI INFORMATIKA
UNIVERSITAS MULAWARMAN
SAMARINDA
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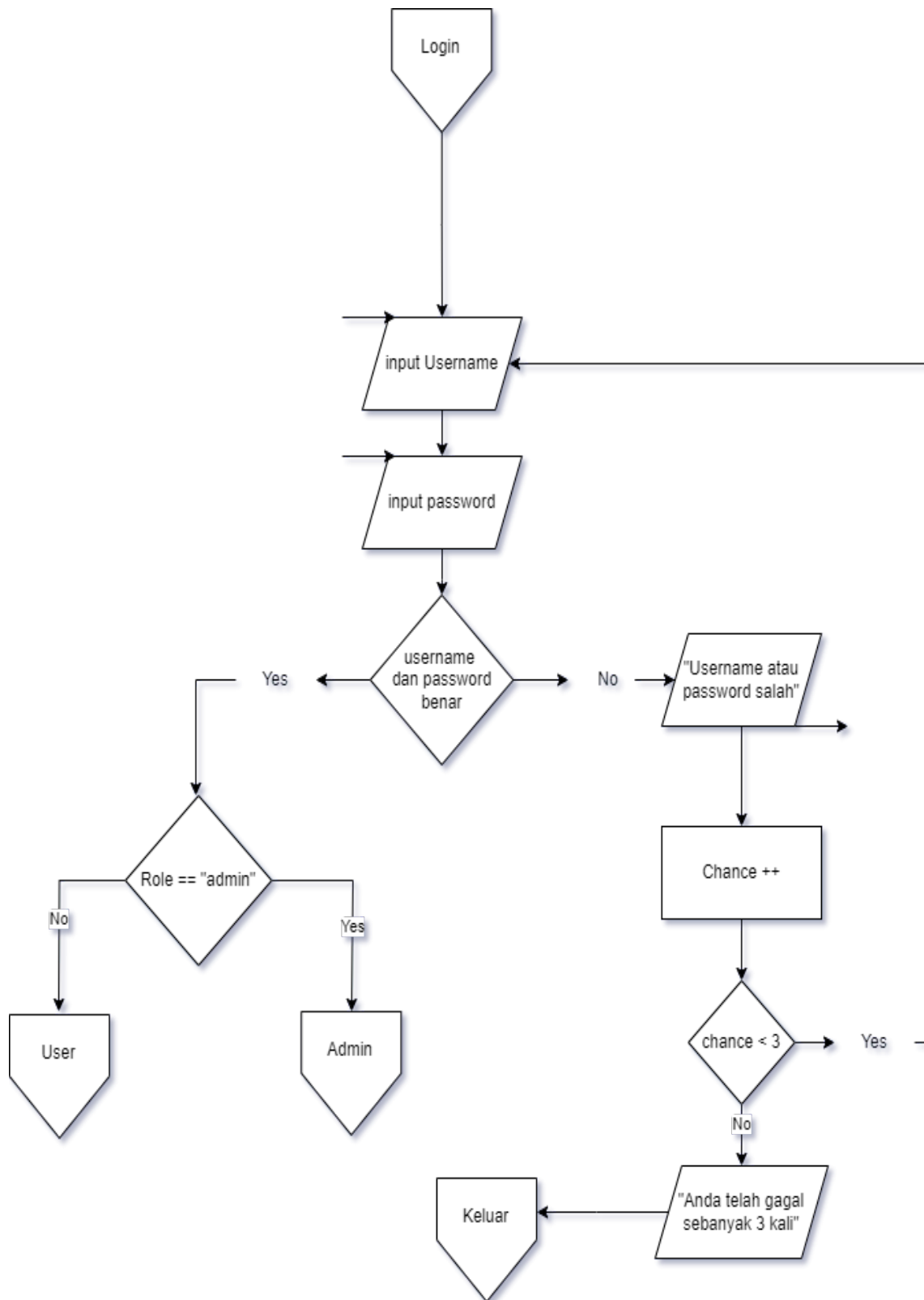
1. Flowchart

1.1 Menu Awal



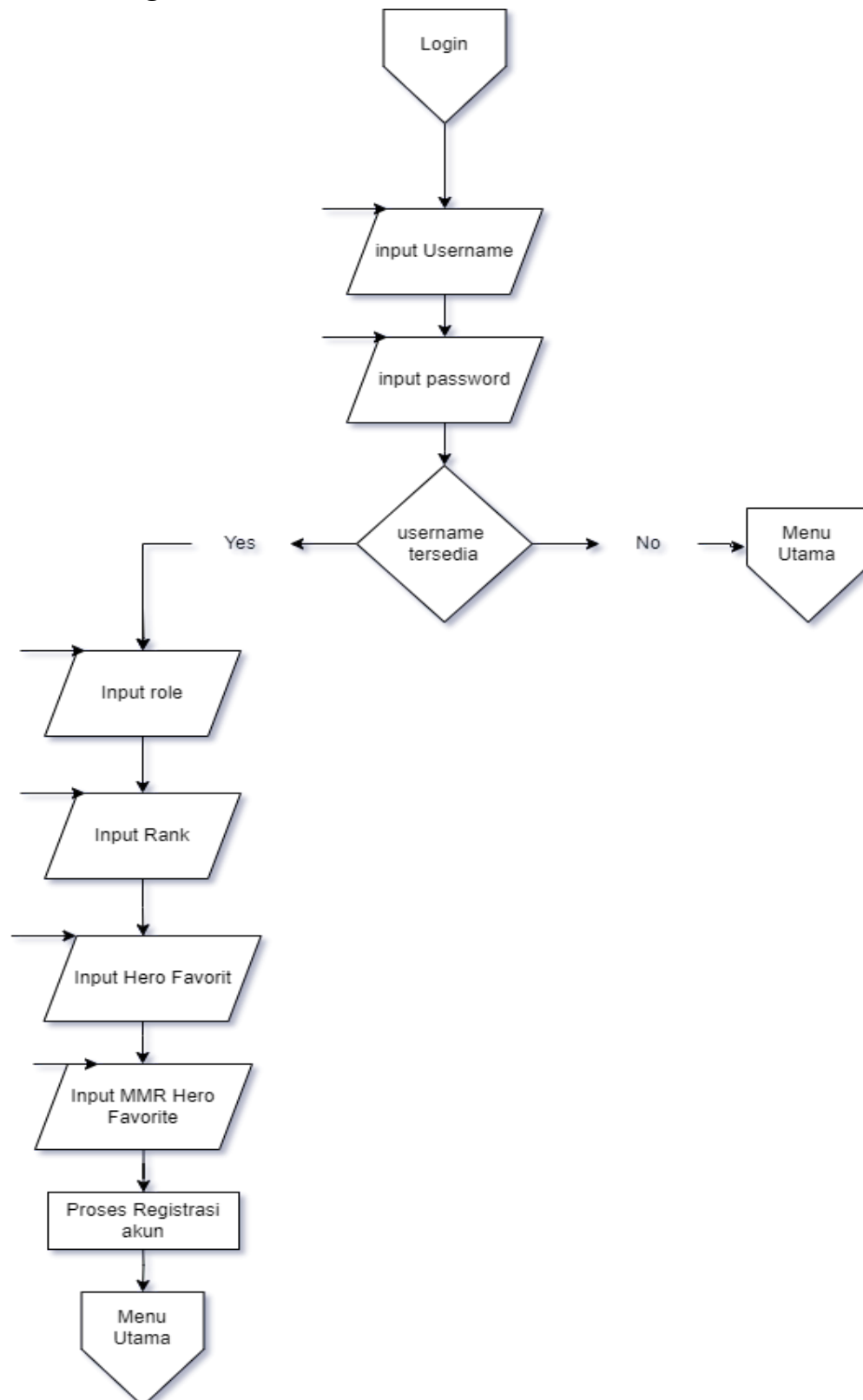
1.1 Flowchat Menu Awal

1.2 Menu Login



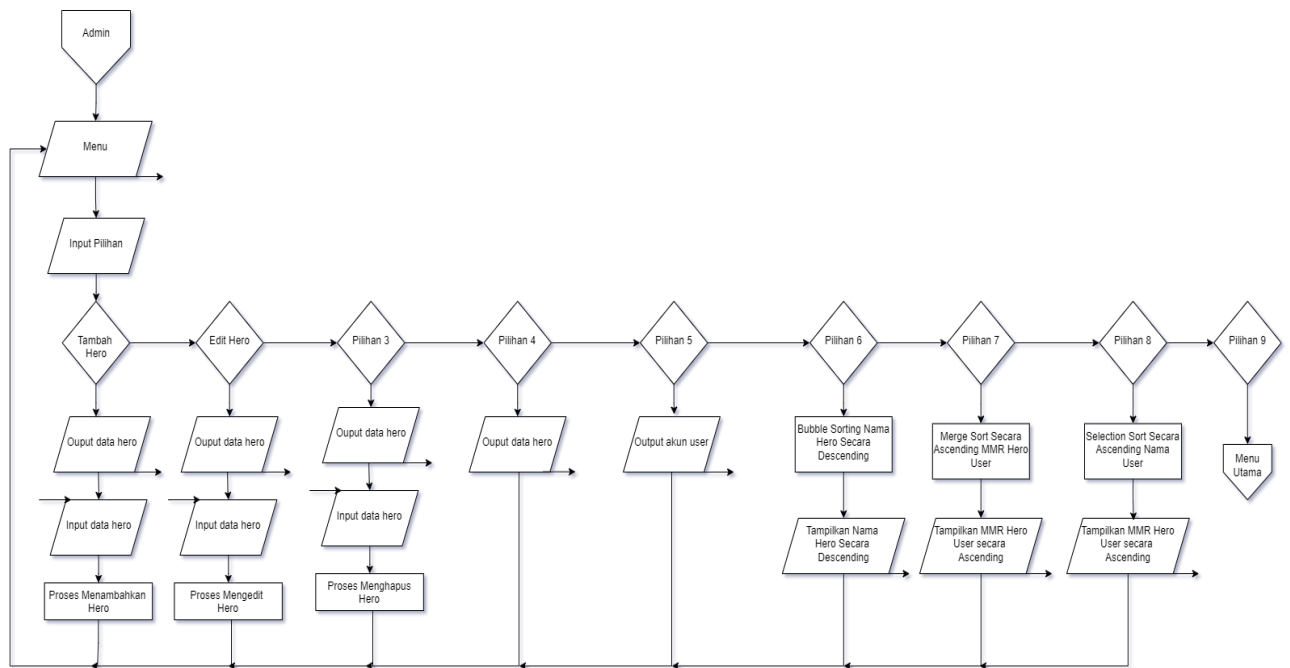
1.2 Flowchart Menu Login

1.3 Menu Regia



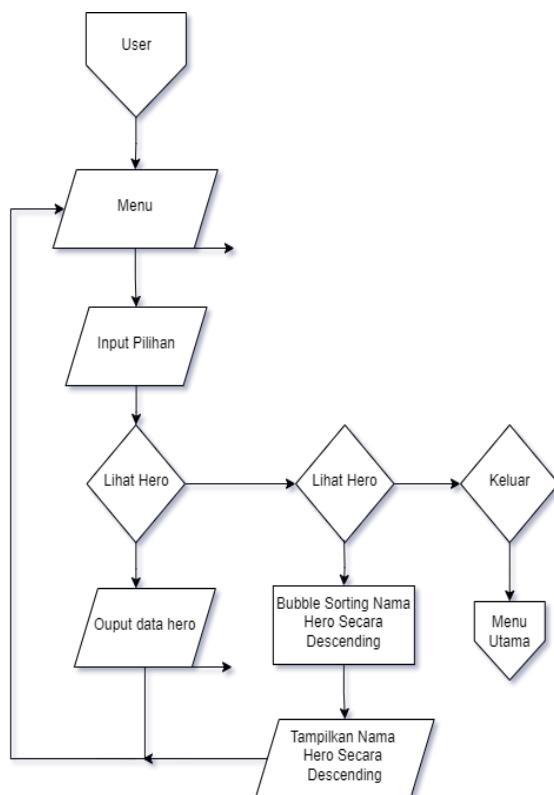
1.3 Flowchart Menu Regis

1.4 Menu Admin



1.4 Flowchart Menu Admin

1.5 Menu User



1.5 Flowchart Menu User

2. Analisis Program

2.1 Deskripsi Singkat Program

Program ini merupakan sebuah program dimana kita dapat melakukan CRUD pada sebuah data hero Mobile Legend, disini kita dapat melihat role, mekanik hero yang ada di Mobile Legend.

Program ini diawali dengan menu utama dengan 3 pilihan yaitu login, registrasi, keluar. Jika user memilih untuk registrasi pengguna dapat melakukan registrasi akun dimana akan diminta username dan password, lalu role. Ketika pengguna ingin login akan diminta password dan username, jika gagal sebanyak 3 kali maka program akan berhenti. Sebaliknya jika username dan passwordnya benar maka akan ditunjukkan ke program utama. Dalam program utama memiliki dua role yaitu admin dan user, admin dapat melakukan CRUD pada data hero serta melihat akun user, sedangkan user hanya dapat melihat data hero yang ada.

3. Source Code

3.1 Menu Main

Fungsi main dimana tempat sistem dapat berjalan

Source Code:

```
int main() {
    cls();

    while (true) {
        tampilkanMenuUtama();
        getline(cin, choice);

        if (choice == "1") {
            kesempatan = 0;
            quit = false;
            if (attemptLogin(0)) {
                if (rolesekarang == "admin") {
                    adminMenu();
                } else {
                    userMenu();
                }
            }
        }
        else if (choice == "2") {
            if (registerUser()) {
                cls();
                cout << "Registrasi berhasil." << endl;
            }
        }
    }
}
```

```

    }
    } else if (choice == "3") {
        cout << "Exit" << endl;
        break;
    } else {
        cls();
        cout << "Pilihan tidak valid" << endl;
    }
}

return 0;
}

```

3.1 Menu Awal

Menu ini merupakan menu awal dimana user dapat memilih untuk melakukan regis, login atau keluar dari program

Source Code:

```

void tampilkanMenuUtama() {
    cout << "Selamat datang di program manajemen hero Mobile Legends" <<
endl;
    cout << "1. Login" << endl;
    cout << "2. Register" << endl;
    cout << "3. Exit" << endl;
    cout << "Masukkan pilihan anda: ";
}

```

Gambar 3.1 Source Code Menu Awal

3.2 Menu Login

Menu dimana pengguna akan ditunjukkan konversi apa saja yang dapat dilakukan dan setelahnya pengguna dapat melakukan input pilihan menu jenis konversi apa yang mereka inginkan dan program akan berlanjut ke sub menu.

Source Code:

```
bool attemptLogin(int attempts) {
    if (attempts >= 3) {
        cls();
        cout << "Anda sudah mencoba login sebanyak 3 kali. Program berakhir." << endl;
        exit(0);
        return false;
    }

    cout << "Masukkan username: ";
    getline(cin, username);
    cout << "Masukkan password: ";
    getline(cin, password);
    cls();

    if (loginUser(username, password, rolesekarang)) {
        return true;
    } else {
        cout << "Username atau password salah." << endl;
        return attemptLogin(attempts + 1);
    }
}
```

3.2 Source Code Menu Login

3.3 Menu Registrasi

Menu ini merupakan menu yang dimana user dapat melakukan registrasi akun yang baru.

Source Code:

```
bool registerUser(string newUsername, string newPassword, string
newRole) {
    if (newRole == "admin") {
        user[jumlahAkun] = {"", "", ""}, newUsername,
newPassword, newRole};
        jumlahAkun++;
        return true;
    } else if (newRole == "user") {
        string heromain, mainrole, rankakun;

        cout << "Masukkan hero main: ";
        getline(cin, heromain);

        cout << "Masukkan main role: ";
        getline(cin, mainrole);

        cout << "Masukkan rank akun: ";
        getline(cin, rankakun);

        user[jumlahAkun] = {{heromain, mainrole, rankakun},
newUsername, newPassword, newRole};
        jumlahAkun++;
        return true;
    }

    return false;
}
```

3.3 Source Code Menu Registrasi

3.4 Menu Admin

Menu ini berfungsi untuk admin memilih apa yang ingin dilakukan dengan data, entah melakukan *create*, *read*, *update*, ataupun *delete*.

Source Code:

```
void adminMenu() {
    while (true) {
        cout << "Admin Menu:" << endl;
        cout << "1. Tambah Hero" << endl;
        cout << "2. Edit Hero" << endl;
        cout << "3. Hapus Hero" << endl;
        cout << "4. Lihat Hero" << endl;
        cout << "5. Lihat akun user" << endl;
        cout << "6. Daftar Hero Secara Descending" << endl;
        cout << "7. Daftar MMR hero favorit akun user secara
Ascending" << endl;
        cout << "8. Daftar Nama User Secara Ascending" << endl;
        cout << "9. Logout" << endl;
        cout << "Masukkan pilihan anda: ";
        getline(cin, choice);
        cls();

        if (choice == "1") {
            tambahHero();
        } else if (choice == "2") {
            editHero();
        } else if (choice == "3") {
            hapusHero();
        } else if (choice == "4") {
            tampilkanHero();
        } else if (choice == "5") {
            lihatAkunUser();
        } else if (choice == "6") {
            daftarHeroDescending();
        } else if (choice == "7") {
            lihatMMRFavorit();
        } else if (choice == "8") {
            daftarNamaUserAscending();
        } else if (choice == "9") {
            quit = true;
            break;
        }
    }
}
```

```

    } else {
        cls();
        cout << "Pilihan tidak valid." << endl;
    }
}
}

```

3.4 Source Code Menu Admin

3.5 Menu User

Menu ini berfungsi untuk agar user dapat memilih apa yang user ingin gunakan.

Source code:

```

void userMenu() {
    while (true) {
        cout << "Login berhasil sebagai user." << endl;
        cout << "1. Lihat list hero" << endl;
        cout << "2. Daftar hero secara Descending" << endl;
        cout << "3. Logout" << endl;
        cout << "Masukkan pilihan anda: ";
        getline(cin, choice);
        cls();

        if (choice == "1") {
            tampilkanHero();
        } else if (choice == "2") {
            daftarHeroDescending();
        } else if (choice == "3") {
            quit = true;
            break;
        } else {
            cls();
            cout << "Pilihan tidak valid." << endl;
        }
    }
}
}

```

3.5 Source Code Menu User

3.6 Fungsi Melihat Hero

Fungsi dimana pengguna dapat melakukan melihat list hero yang ada dalam array.

Source Code:

```
void tampilkanHero() {
    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+" <<
    endl;
    cout << "| " << left << setw(18) << "Nama" << " | " <<
    setw(18) << "Role" << " | " << setw(18) << "Mekanik" << " | " <<
    setw(18) << "Posisi" << " | " << endl;

    for (int i = 0; i < 5; ++i) {
        cout << "+-" << string(18, '-') << "-+-" << string(18,
        '-') << "-+-" << string(18, '-') << "-+-" << string(18, '-') <<
        "-+" << endl;

        for (int j = 0; j < 10; ++j) {
            if (listhero[i][j][0][0] != '\\0') {
                cout << "| " << left << setw(18) <<
listhero[i][j][0] << " | "
                << setw(18) << listhero[i][j][1] << " | "
                << setw(18) << listhero[i][j][2] << " | "
                << setw(18) << listhero[i][j][3] << " | " <<
endl;
            }
        }
    }

    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+" <<
    endl;
}
```

3.6 Source Code Fungsi Melihat Hero

3.7 Fungsi Menambah Hero

Fungsi ini berfungsi untuk menambah hero sesuai pada array hero.

Source Code:

```
void tambahHero() {
    herotersedia = false;
    ada = false;
    cout << "Masukkan nama hero: ";
    getline(cin, nama);

    int posIndex, heroIndex;
    if (carihero(&nama, posIndex, heroIndex)) {
        cls();
        cout << "Hero sudah ada." << endl;
        return;
    }

    cout << "Masukkan role hero: ";
    getline(cin, role);
    cout << "Masukkan tingkat mekanik hero: ";
    getline(cin, mekanik);
    cout << "Masukkan posisi hero: ";
    cout << "\n1. Jungle" << endl;
    cout << "2. Roam" << endl;
    cout << "3. Mid" << endl;
    cout << "4. Gold" << endl;
    cout << "5. EXP" << endl;
    cout << "Masukkan pilihan anda: ";
    getline(cin, posisi);

    int posisiIndex = posisiindex(posisi);
    string posisiStr = posisistr(posisiIndex);

    if (posisiIndex == -1) {
        cls();
        cout << "Posisi tidak valid." << endl;
        return;
    }

    for (int j = 0; j < 10; ++j) {
        if (listhero[posisiIndex][j][0] == "") {
```

```

        listhero[posisiIndex][j][0] = nama;
        listhero[posisiIndex][j][1] = role;
        listhero[posisiIndex][j][2] = mekanik;
        listhero[posisiIndex][j][3] = posisiStr;
        cls();
        cout << "Hero berhasil ditambahkan." << endl;
        ada = true;
        break;
    }
}

if (!ada) {
    cls();
    cout << "Kategori penuh, tidak bisa menambah hero baru."
<< endl;
}
}

```

3.7 Source Code Menambah Hero

3.8 Fungsi Mengedit Hero

Fungsi dimana pengguna dapat mengubah data hero pada array seperti mekanik, posisi dan role.

Source Code:

```
void editHero() {
    moved = false;
    ditemukan = false;
    tampilkanHero();

    cout << "Masukkan nama hero yang ingin diedit: ";
    getline(cin, nama);

    int posIndex, heroIndex;

    if (carihero(&nama, posIndex, heroIndex)) {
        cout << "Masukkan role baru: ";
        getline(cin, listhero[posIndex][heroIndex][1]);
        cout << "Masukkan tingkat mekanik baru: ";
        getline(cin, listhero[posIndex][heroIndex][2]);
        cout << "Masukkan posisi baru: ";
        cout << "\n1. Jungle" << endl;
        cout << "2. Roam" << endl;
        cout << "3. Mid" << endl;
        cout << "4. Gold" << endl;
        cout << "5. EXP" << endl;
        cout << "Masukkan pilihan anda: ";
        getline(cin, choice);

        int posisibaru = posisiindex(choice);
        string posisinew = posisistr(posisibaru);

        if (posisibaru == -1) {
            cout << "Pilihan tidak valid." << endl;
            return;
        }

        for (int k = 0; k < 10; ++k) {
            if (listhero[posisibaru][k][0][0] != '\\0') {
                listhero[posisibaru][k][0] =
listhero[posIndex][heroIndex][0];
```

```

        listhero[posisibaru][k][1] =
listhero[posIndex][heroIndex][1];
        listhero[posisibaru][k][2] =
listhero[posIndex][heroIndex][2];
        listhero[posisibaru][k][3] = posisinew;

        for (int l = heroIndex; l < 9; ++l) {
            listhero[posIndex][l][0] =
listhero[posIndex][l + 1][0];
            listhero[posIndex][l][1] =
listhero[posIndex][l + 1][1];
            listhero[posIndex][l][2] =
listhero[posIndex][l + 1][2];
            listhero[posIndex][l][3] =
listhero[posIndex][l + 1][3];
        }

        listhero[posIndex][9][0] = "";
        listhero[posIndex][9][1] = "";
        listhero[posIndex][9][2] = "";
        listhero[posIndex][9][3] = "";

        cls();
        cout << "Hero berhasil dipindahkan." << endl;
        moved = true;
        break;
    }
}

if (!moved) {
    cls();
    cout << "Kategori baru penuh, tidak bisa memindahkan
hero." << endl;
}
ditemukan = true;
}

if (!ditemukan) {
    cls();
    cout << "Hero tidak ditemukan." << endl;
}

```

3. 8 Source Code Fungsi Mengedit Hero

3.9 Fungsi Menghapus Hero

Fungsi yang berguna agar pengguna dapat menghapus data hero pada array.

Source Code:

```
void hapusHero() {
    cls();
    int posisi, index;
    cout << "1. Jungle" << endl;
    cout << "2. Roam" << endl;
    cout << "3. Mid" << endl;
    cout << "4. Gold" << endl;
    cout << "5. EXP" << endl;
    cout << "Masukkan posisi hero yang akan dihapus (1-5): ";
    cin >> posisi;
    cin.ignore();
    posisi--;

    if (posisi < 0 || posisi >= 5) {
        cout << "Posisi tidak valid." << endl;
        return;
    }

    int panjang = 0;
    cout << "+-" << string(18, '-') << "-+" << string(18, '-') <<
    "-+" << string(18, '-') << "-+" << string(18, '-') << "-+" <<
    string(18, '-') << "-+" << endl;
    cout << "| " << left << setw(18) << "No" << " | " << setw(18)
    << "Nama" << " | " << setw(18) << "Role" << " | " << setw(18) <<
    "Mekanik" << " | " << setw(18) << "Posisi" << " | " << endl;
    cout << "+-" << string(18, '-') << "-+" << string(18, '-') <<
    "-+" << string(18, '-') << "-+" << string(18, '-') << "-+" <<
    string(18, '-') << "-+" << endl;

    for (int j = 0; j < 10; ++j) {
        if (listhero[posisi][j][0] != "") {
            cout << "| " << left << setw(18) << panjang + 1 << " |
            " << setw(18) << listhero[posisi][j][0] << " | " << setw(18) <<
            listhero[posisi][j][1] << " | " << setw(18) <<
            listhero[posisi][j][2] << " | " << setw(18) <<
            listhero[posisi][j][3] << " | " << endl;
        }
    }
}
```

```

        panjang++;
    }
}

    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(18, '-') << "-+" << endl;

    if (panjang == 0) {
        cout << "Belum ada hero untuk dihapus." << endl;
    } else {
        cout << "Masukkan nomor hero yang akan dihapus: ";
        cin >> index;
        cin.ignore();

        if (index > 0 && index <= panjang) {
            int actualIndex = -1;
            int count = 0;

            for (int j = 0; j < 10; ++j) {
                if (listhero[posisi][j][0] != "") {
                    count++;
                    if (count == index) {
                        actualIndex = j;
                        break;
                    }
                }
            }

            if (actualIndex != -1) {
                for (int j = actualIndex; j < 9; ++j) {
                    listhero[posisi][j][0] = listhero[posisi][j +
1][0];
                    listhero[posisi][j][1] = listhero[posisi][j +
1][1];
                    listhero[posisi][j][2] = listhero[posisi][j +
1][2];
                    listhero[posisi][j][3] = listhero[posisi][j +
1][3];
                }

                listhero[posisi][9][0] = "";

```

```

        listhero[posisi][9][1] = "";
        listhero[posisi][9][2] = "";
        listhero[posisi][9][3] = "";

        cls();
        cout << "Hero berhasil dihapus." << endl;
    }
} else {
    cls();
    cout << "Nomor hero tidak valid." << endl;
}
}
}
}

```

3.9 Source Code Fungsi Menghapus Hero

3.10 Fungsi Melihat Akun User

Fungsi ini dapat melihat akun user yang telah terdaftar beserta datanya seperti main hero, main role, dan rank akun.

Source Code:

```

void lihatAkunUser() {
    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(18, '-') << "-+" << endl;
    cout << "| " << left << setw(18) << "Username" << " | " <<
    setw(18) << "Role" << " | " << setw(18) << "Main Hero" << " | " <<
    setw(18) << "Main Role" << " | " << setw(18) << "Rank Akun" << "
    |" << endl;
    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(18, '-') << "-+" << endl;

    for (int i = 0; i < jumlahAkun; ++i) {
        if (user[i].username != "" && user[i].role != "admin") {
            cout << "| " << left << setw(18) << user[i].username
            << " | " << setw(18) << user[i].role << " | " << setw(18) <<
            user[i].isiakun.heromain << " | " << setw(18) <<
            user[i].isiakun.mainrole << " | " << setw(18) <<
            user[i].isiakun.rankakun << " |" << endl;
        }
    }
}

```

```

    }

    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(18, '-') << "-+" << endl;
}

```

3.11 Daftar Hero Secara Descending

Menampilkan daftar hero secara descending.

Source Code:

```

void daftarHeroDescending() {

    struct HeroData {
        string nama;
        string role;
        string mekanik;
        string posisi;
    };

    HeroData heroes[50];
    int count = 0;

    for (int i = 0; i < 5; ++i) {
        for (int j = 0; j < 10; ++j) {
            if (listhero[i][j][0][0] != '\\0') {
                heroes[count].nama = listhero[i][j][0];
                heroes[count].role = listhero[i][j][1];
                heroes[count].mekanik = listhero[i][j][2];
                heroes[count].posisi = listhero[i][j][3];
                count++;
            }
        }
    }

    for (int i = 0; i < count - 1; ++i) {
        for (int j = 0; j < count - i - 1; ++j) {
            if (heroes[j].nama < heroes[j + 1].nama) {
                HeroData temp = heroes[j];
                heroes[j] = heroes[j + 1];
                heroes[j + 1] = temp;
            }
        }
    }
}

```

```

    }
}

cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
"-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+" <<
endl;

cout << "| " << left << setw(18) << "Nama Hero" << " | " <<
setw(18) << "Role" << " | " << setw(18) << "Mekanik" << " | " <<
setw(18) << "Posisi" << " | " << endl;

cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
"-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+" <<
endl;

for (int i = 0; i < count; ++i) {
    cout << "| " << left << setw(18) << heroes[i].nama << " | "
    << setw(18) << heroes[i].role << " | " << setw(18) <<
    heroes[i].mekanik << " | " << setw(18) << heroes[i].posisi << " | "
    << endl;
}

cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
"-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+" <<
endl;
}

```

3.11 Daftar MMR secara Ascending

Menampilkan daftar mmr user secara ascending.

Source Code:

```

void lihatMMRFavorit() {

    Akun temp[30];
    int count = 0;
    for (int i = 0; i < jumlahAkun; i++) {
        if (user[i].role != "admin") {
            temp[count] = user[i];
            count++;
        }
    }
}

```

```

mergeSort(temp, 0, count - 1);

    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(10, '-') << "+-" << endl;
    cout << "| " << left << setw(18) << "Username"
        << " | " << setw(18) << "Hero Main"
        << " | " << setw(18) << "Main Role"
        << " | " << setw(18) << "Rank Akun"
        << " | " << setw(10) << "MMR" << " |" << endl;
    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(10, '-') << "+-" << endl;

    for (int i = 0; i < count; i++) {
        cout << "| " << left << setw(18) << temp[i].username
            << " | " << setw(18) << temp[i].isiakun.heromain
            << " | " << setw(18) << temp[i].isiakun.mainrole
            << " | " << setw(18) << temp[i].isiakun.rankakun
            << " | " << setw(10) << temp[i].isiakun.mmr << " |"
        << endl;
    }

    cout << "+-" << string(18, '-') << "-+-" << string(18, '-') <<
    "-+-" << string(18, '-') << "-+-" << string(18, '-') << "-+-" <<
    string(10, '-') << "+-" << endl;
}

```

3.12 Daftar Nama User secara Ascending

Menampilkan daftar user secara Ascending.

Source Code:

```

void daftarNamaUserAscending() {

    for (int i = 0; i < jumlahAkun - 1; i++) {
        int min = i;
        for (int j = i + 1; j < jumlahAkun; j++) {
            if (user[j].username < user[min].username) {
                min = j;
            }
        }
        swap(user[i], user[min]);
    }
}

```

```

    }
}
// Tukar posisi
Akun temp = user[i];
user[i] = user[min];
user[min] = temp;
}

cout << "+-" << string(18, '-') << "-+" << endl;
cout << "| " << left << setw(18) << "Username" << " |" <<
endl;
cout << "+-" << string(18, '-') << "-+" << endl;

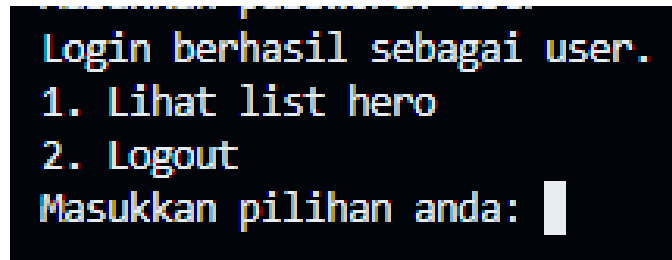
for (int i = 0; i < jumlahAkun; i++) {
    if (user[i].role != "admin") {
        cout << "| " << left << setw(18) << user[i].username
<< " |" << endl;
    }
}

cout << "+-" << string(18, '-') << "-+" << endl;
}

```

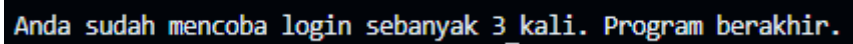
4. Uji Coba dan Hasil Output

4.1 Login



```
Login berhasil sebagai user.  
1. Lihat list hero  
2. Logout  
Masukkan pilihan anda: 
```

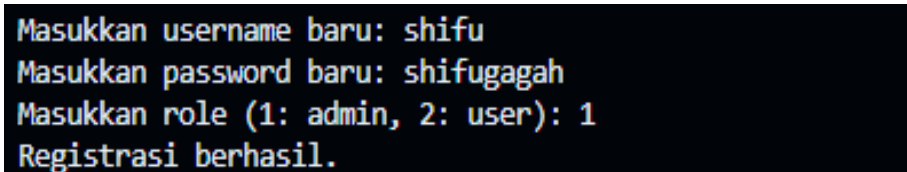
Gambar 4.1.1 Login Berhasil



```
Anda sudah mencoba login sebanyak 3 kali. Program berakhir.
```

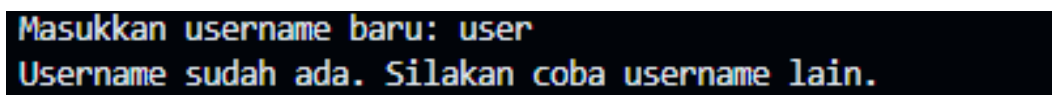
Gambar 4.1.2 Login Gagal

4.2 Regis



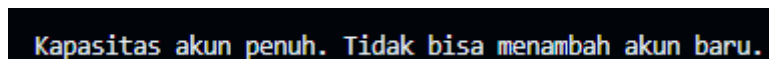
```
Masukkan username baru: shifu  
Masukkan password baru: shifugagah  
Masukkan role (1: admin, 2: user): 1  
Registrasi berhasil.
```

Gambar 4.2.1 Registrasi Berhasil Admin



```
Masukkan username baru: user  
Username sudah ada. Silakan coba username lain.
```

Gambar 4.2.2 Registrasi Gagal



```
Kapasitas akun penuh. Tidak bisa menambah akun baru.
```

Gambar 4.2.3 Registrasi Gagal 2


```

Masukkan username baru: sifwah
Masukkan password baru: ganteng
Masukkan role (1: admin, 2: user): 2
Masukkan hero main: Benedetta
Masukkan main role: EXP
Masukkan rank akun: Honor Abadi

```

Gambar 4.2.4 Registrasi User

4.3 Pilihan Tidak Valid

Pilihan tidak valid

4.4 Fungsi Menampilkan Data Hero

Nama	Role	Mekanik	Posisi
Fanny	Assassin	Mekanik tinggi	Jungle
Ling	Assassin	Mekanik tinggi	Jungle
Nolan	Assassin	Mekanik tinggi	Jungle
Julian	Assassin, Mage	Mekanik sedang	Jungle
Hayabusa	Assassin	Mekanik tinggi	Jungle
Gatotkaca	Tank, Fighter	Mekanik mudah	Roam
Edith	Tank	Mekanik sedang	Roam
Chip	Support, Tank	Mekanik sedang	Roam
Angela	Support	Mekanik rendah	Roam
Mathilda	Support	Mekanik rendah	Roam
Grock	Support	Mekanik sedang	Roam
Valentina	Mage	Mekanik sedang	Mid
Yve	Mage	Mekanik sedang	Mid
Faramis	Mage	Mekanik sedang	Mid
Aurora	Mage	Mekanik rendah	Mid
Zhuxin	Mage	Mekanik sedang	Mid
Harith	Mage	Mekanik tinggi	Gold
Moskov	Marksman	Mekanik tinggi	Gold
Claude	Marksman	Mekanik tinggi	Gold
Nathan	Marksman	Mekanik tinggi	Gold
Roger	Fighter, Marksman	Mekanik tinggi	Gold
Lunox	Mage	Mekanik tinggi	Gold
Miya	Marksman	Mekanik tinggi	Gold
Ruby	Fighter	Mekanik sedang	EXP
Edith	Tank, Fighter	Mekanik sedang	EXP
Terizla	Fighter	Mekanik sedang	EXP
Arlott	Fighter	Mekanik sedang	EXP
Phoveus	Fighter	Mekanik sedang	EXP
Gatotkaca	Tank, Fighter	Mekanik sedang	EXP

Gambar 4.4 Menampilkan data hero

4.5 Fungsi Menambah Hero

```
Masukkan nama hero: Lukas  
Masukkan role hero: Fighter  
Masukkan tingkat mekanik hero: Tinggi  
Masukkan posisi hero:  
1. Jungle  
2. Roam  
3. Mid  
4. Gold  
5. EXP  
Masukkan pilihan anda: 5
```

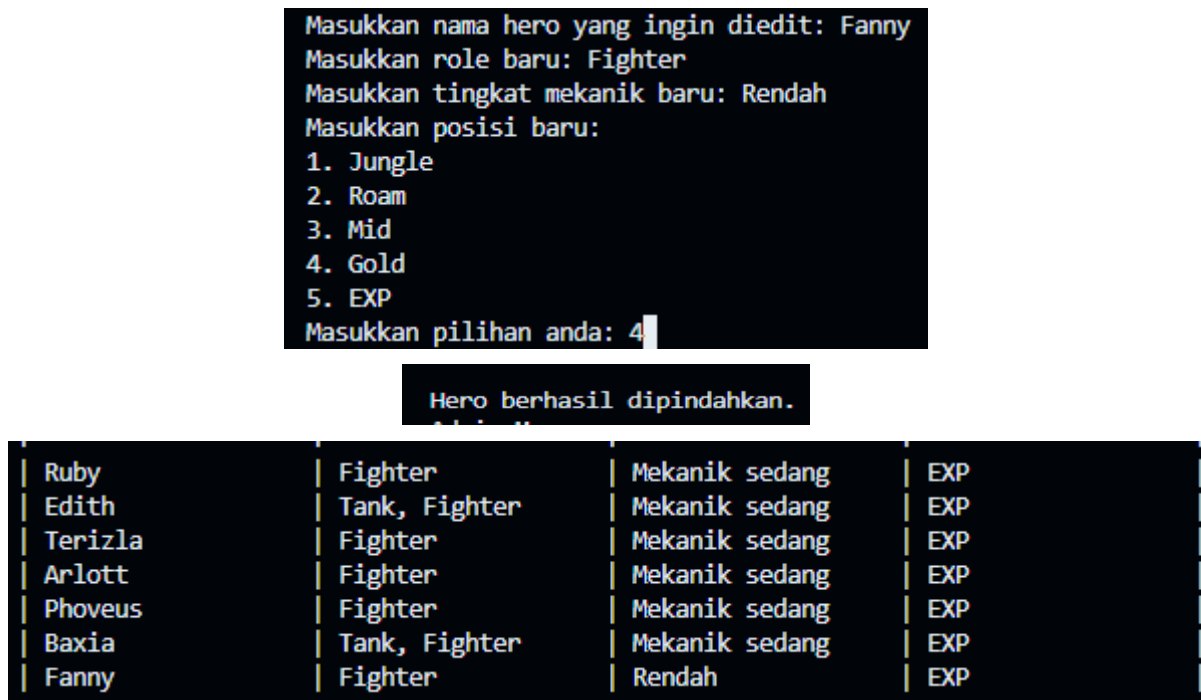
```
Hero berhasil ditambahkan.
```

Gambar 4.5.1 Berhasil Menambahkan hero

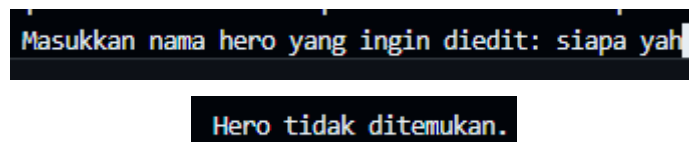
```
Hero sudah ada. Kategori penuh, tidak bisa menambah hero baru.
```

Gambar 4.5.2 Gagal menambahkan hero

4.6 Fungsi mengubah data hero.



Gambar 4.6.1 Berhasil Mengubah Data Hero



Gambar 4.6.2 Gagal Menghapus Data Hero

4.7 Fungsi menghapus hero di array

No	Nama	Role	Mekanik	Posisi
1	Fanny	Assassin	Mekanik tinggi	Jungle
2	Ling	Assassin	Mekanik tinggi	Jungle
3	Nolan	Assassin	Mekanik tinggi	Jungle
4	Julian	Assassin, Mage	Mekanik sedang	Jungle
5	Hayabusa	Assassin	Mekanik tinggi	Jungle

Masukkan nomor hero yang akan dihapus: 1

Nama	Role	Mekanik	Posisi
Ling	Assassin	Mekanik tinggi	Jungle
Nolan	Assassin	Mekanik tinggi	Jungle
Julian	Assassin, Mage	Mekanik sedang	Jungle
Hayabusa	Assassin	Mekanik tinggi	Jungle

Gambar 4.7 Berhasil Menghapus Data Hero

4.8 Menampilkan Akun User

Username	Role	Main Hero	Main Role	Rank Akun
user	user	Fanny	Jungle	Mythic
sifwah	user	Benedetta	EXP	Honor Abadi
ripa	user	Granger	Gold	Immortal
Nabil	user	Jett	Duelist	Radiant
Jovan	user	Beleric	Roam	Glory

Gambar 4.8 Menampilkan Akun User

4.9 Menampilkan Nama Hero Secara Descending

Nama Hero	Role	Mekanik	Posisi
Zhuxin	Mage	Mekanik sedang	Mid
Yve	Mage	Mekanik sedang	Mid
Valentina	Mage	Mekanik sedang	Mid
Terizla	Fighter	Mekanik sedang	EXP
Ruby	Fighter	Mekanik sedang	EXP
Roger	Fighter, Marksman	Mekanik tinggi	Gold
Phoveus	Fighter	Mekanik sedang	EXP
Nolan	Assassin	Mekanik tinggi	Jungle
Nathan	Marksman	Mekanik tinggi	Gold
Moskov	Marksman	Mekanik tinggi	Gold
Miya	Marksman	Mekanik tinggi	Gold
Mathilda	Support	Mekanik rendah	Roam
Lunox	Mage	Mekanik tinggi	Gold
Ling	Assassin	Mekanik tinggi	Jungle
Julian	Assassin, Mage	Mekanik sedang	Jungle
Hayabusa	Assassin	Mekanik tinggi	Jungle
Harith	Mage	Mekanik tinggi	Gold
Grock	Support	Mekanik sedang	Roam
Gatotkaca	Tank, Fighter	Mekanik mudah	Roam
Faramis	Mage	Mekanik sedang	Mid
Fanny	Assassin	Mekanik tinggi	Jungle
Edith	Tank	Mekanik sedang	Roam
Edith	Tank, Fighter	Mekanik sedang	EXP
Claude	Marksman	Mekanik tinggi	Gold
Chip	Support, Tank	Mekanik sedang	Roam
Baxia	Tank, Fighter	Mekanik sedang	EXP
Aurora	Mage	Mekanik rendah	Mid
Arlott	Fighter	Mekanik sedang	EXP
Angela	Support	Mekanik rendah	Roam

Gambar 4.9 Menampilkan Hero Secara Descending

4.10 Daftar MMR Akun User

Username	Hero Main	Main Role	Rank Akun	MMR
user	Fanny	Jungle	Mythic	2000
Dzaki	Gatotkaca	Jungle	Mythic	4200
Wahyu	Zhuxin	Mid	Mythic	4500
Ridwan	Phoveus	EXP	Mythic	4600
Riva	Harith	Jungle	Mythic	5000

Gambar 4.10 Menampilkan MMR Hero Secara Descending

4.11 Menampilkan Nama User Secara Ascending



```
+-----+
| Username |
+-----+
| Dzaki    |
| Ridwan   |
| Riva     |
| Wahyu    |
| user     |
+-----+
```

A terminal window with a black background and yellow text. It displays a table with a single column of usernames. The table is enclosed in a dashed border with '+' characters at the corners. The usernames are listed in ascending order: Dzaki, Ridwan, Riva, Wahyu, and user.

Username
Dzaki
Ridwan
Riva
Wahyu
user

Gambar 4.11 Menampilkan MMR Hero Secara Descending

5. Langkah Langkah Git

5.1 Git Add

Git add merupakan perintah untuk menambahkan file yang ingin di commit.

```
MSI Ryzen 5@Sifs MINGW64 ~/Desktop/Praktikum-APL/Posttest/Posttest6 (main)
$ git add .
warning: in the working copy of 'Posttest/Posttest6/2409106072_Sifwah Fatin Sofwani_Posttest6.cpp', LF will be replaced
by CRLF the next time Git touches it
```

5.1 Git Add

5.2 Git Commit

Commit adalah tindakan menyimpan perubahan kode ke dalam local repository (penyimpanan lokal).

```
MSI Ryzen 5@Sifs MINGW64 ~/Desktop/Praktikum-APL/Posttest/Posttest6 (main)
$ git commit -m "Finish Program"
[main 2a312db] Finish Program
2 files changed, 762 insertions(+)
create mode 100644 Posttest/Posttest6/2409106072_Sifwah Fatin Sofwani_Posttest6.cpp
create mode 100644 Posttest/Posttest6/2409106072_Sifwah Fatin Sofwani_Posttest6.exe
```

5.2 Git Commit

5.3 Git Push

Push adalah perintah untuk mengirim commit dari repositori lokal ke repositori remote (server).

```
MSI Ryzen 5@Sifs MINGW64 ~/Desktop/Praktikum-APL/Posttest/Posttest6 (main)
$ git push -u origin main
Enumerating objects: 8, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 12 threads
Compressing objects: 100% (6/6), done.
Writing objects: 100% (6/6), 697.85 KiB | 4.68 MiB/s, done.
Total 6 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/SifwahFatinSofwani/Praktikum-APL.git
6630d07..2a312db main -> main
branch 'main' set up to track 'origin/main'.
```

5.3 Git Push