Bonus Task: Transition System

TEAM 22
Dishant Sharma - 2022202019
Harshit Kashyap - 2022201050
Shubham Deshmukh - 2022201076
Udrasht Pal - 2022201020
Utkarsh Pathak - 2022201018

1E: Transition System:

A transition system refers to a formal model used to describe the behavior of a system. It consists of a set of states and transitions between them. States represent the possible configurations of the system, and transitions represent the changes that occur as the system moves from one state to another.

A transition system can be used to model a wide range of systems, including software systems.It help to understand how the control flow is made. It creates a better visualization of the system.

A transition system is a six tuple {X,X0,U,f,Y,h} where

* X is the set of states

* X0 is the set of initial states

* U is the set of actions

* f is the transition relation which is a subset of (X*X)*X

* Y is the set of observables (or output space)

* h is a display map, mapping states to observables, y=h(x)

We can use Transition System for

- When the system has some dependencies on the events or on the values in the past.
- State Transition diagram can be used when a software tester is testing the system for a finite set of input values.
- When the software tester focus is to understand the behavior of the object.
- When the software tester focus is to test the sequence of evvents that may occur in the system under test.

Transition system model for User Management

For the six tuple {X,X0,U,f,Y,h} for this system,

X={Login,Home,Settings,MyAccount,Remote Control,Add Music, UploadMusic,External Source, Add imported Music},

X0={Login} ,

U={ClickHome,ClickLogin,ClickLogout,ClickSettings,ClickMyAccount,ClickConnectlastfm, ClickSavePassword, ClickAddMusic, ClickUpload, ClickExternalimport,ClickSelectFile, ClickImport, ClickAddAll,ClickAdd, ClickReject }

Y={OKmessage , AccountUpdateNotification}

Transition function:

f(Login,ClickLogin)=Home,

f(Home,ClickSettings)=Settings

f(Home,ClickLogout)=Login

f(Settings,ClickMyAccount)=MyAccount

f(MyAccount,ClickConnectlastfm)=MyAccount

f(MyAccount, ClickSavePassword)=MyAccount

f(MyAccount,ClickSettings)=Settings

f(MyAccount,ClickHome)=Home

f(MyAccount,ClickLogout)=Login

f(Settings,ClickRemoteControl)=RemoteControl

f(Remote Control,ClickHome)=Home

f(Remote Control,ClickLogout)=Login

f(Home,ClickAddMusic)=AddMusic

f(AddMusic,ClickUpload)=UploadMusic

f(AddMusic,ClickExternalimport)= External Source

f(AddMusic,ClickImportMusic)= Add Imported Music

f(UploadMusic, ClickSelectFile)=UploadMusic

f(External source, ClickImport)=External Source

f(Add Imported Music, ClickAddAll)=Add Imported Music

f(Add Imported Music, ClickAdd)=Add Imported Music

f(Add Imported Music, ClickReject)=Add Imported Music

f(Add Music,ClickHome)=Home

f(Add Music,ClickLogout)=Login

f(UploadMusic,ClickHome)=Home

f(UploadMusic,ClickLogout)=Login

f(External Source,ClickHome)=Home

f(External Source ,ClickLogout)=Login

f(Add Imported Music,ClickHome)=Home

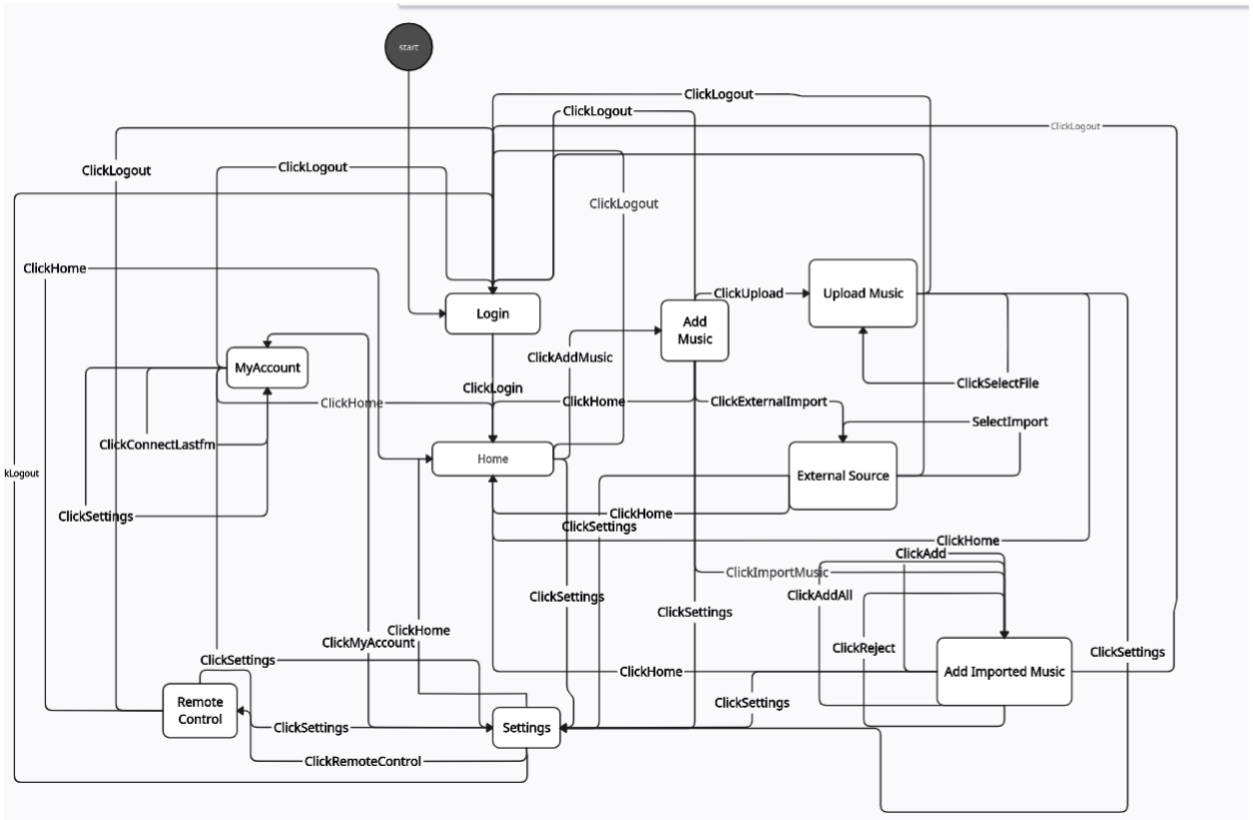
f(Add Imported Music,ClickLogout)=Login

State/Action	ClickLogin	ClickHome	ClickLogout	ClickSettings	ClickMyAccount	ClickConnectlastfm	ClickSavePassword	ClickRemoteControl	ClickAddMusic	ClickUpload	ClickExternalimport	ClickSelectFile	SelectImport	ClickImportMusic	ClickAdd	ClickAddAll	ClickReject
Login	Home																
Home			Login	Settings					AddMusic								
Settings		Home	Login	Settings	MyAccount			Remote Control									
MyAccount		Home	Login	Settings		MyAccount	MyAccount										
Remote Control		Home	Login	Settings													
Add Music		Home	Login	Settings						UploadMusic	External Source			Add Imported Music			
Upload Music		Home	Login	Settings								UploadMusic					
External Source		Home	Login	Settings									External Source				
Add Imported Music		Home	Login	Settings											Add Imported Music	Add Imported Music	Add Imported Music

Display Map

h(Upload Music)= OKmessage
h(My account)=AccountUpdateNotification

Transition Diagram



Transition System for Administrator features

For the six tuple {X,X0,U,f,Y,h} for this system,

X={Login,Home,Settings,MyAccount,Remote Control, Directories, Transcoder, Sanity Check, Server Log,User },

X0={Login} ,

U={ClickHome,ClickLogin,ClickLogout,ClickSettings,ClickMyAccount,ClickConnectlastfm, ClickSavePassword, ClickRemoteControl, ClickDirectories,Clickrescan, ClickAdd, ClickDelete, ClickTranscoder, ClickSanityCheck,ClickUsers,}

Y={DeletionConfirmationPopup,DisplayNotification}

f(Login,ClickLogin)=Home,

f(Home,ClickSettings)=Settings

f(Home,ClickLogout)=Login

f(Settings,ClickMyAccount)=MyAccount

f(MyAccount,ClickConnectlastfm)=MyAccount

f(MyAccount, ClickSavePassword)=MyAccount

f(MyAccount,ClickSettings)=Settings

f(MyAccount,ClickHome)=Home

f(MyAccount,ClickLogout)=Login

f(Settings,ClickDirectories)=Directories

f(Settings,ClickserverLog)=ServerLog

f(Directories,Clickrescan)=Directories

f(Directories,ClickAdd)=Directories

f(Directories,ClickDelete)=Directories

f(Directories,ClickHome)=Home

f(Directories,ClickLogout)=Login

f(Settings, ClickTranscoder)=Transcoder

f(Transcoder,ClickHome)=Home

f(Transcoder,ClickLogout)=Login

f(Service Log,ClickHome)=Home

f(Service Log,ClickLogout)=Login

f(Settings,ClickSanitycheck)= Sanity Check

f(Sanity Check,ClickHome)=Home

f(Sanity Check,ClickLogout)=Login

f(Settings,ClickUsers)=Users

f(Users,ClickHome)=Home
f(Users,ClickLogout)=Login

f(Users,ClickAdd)=Users

f(Users,ClickEdit)=Users

f(Users,Clickdelete)=Users

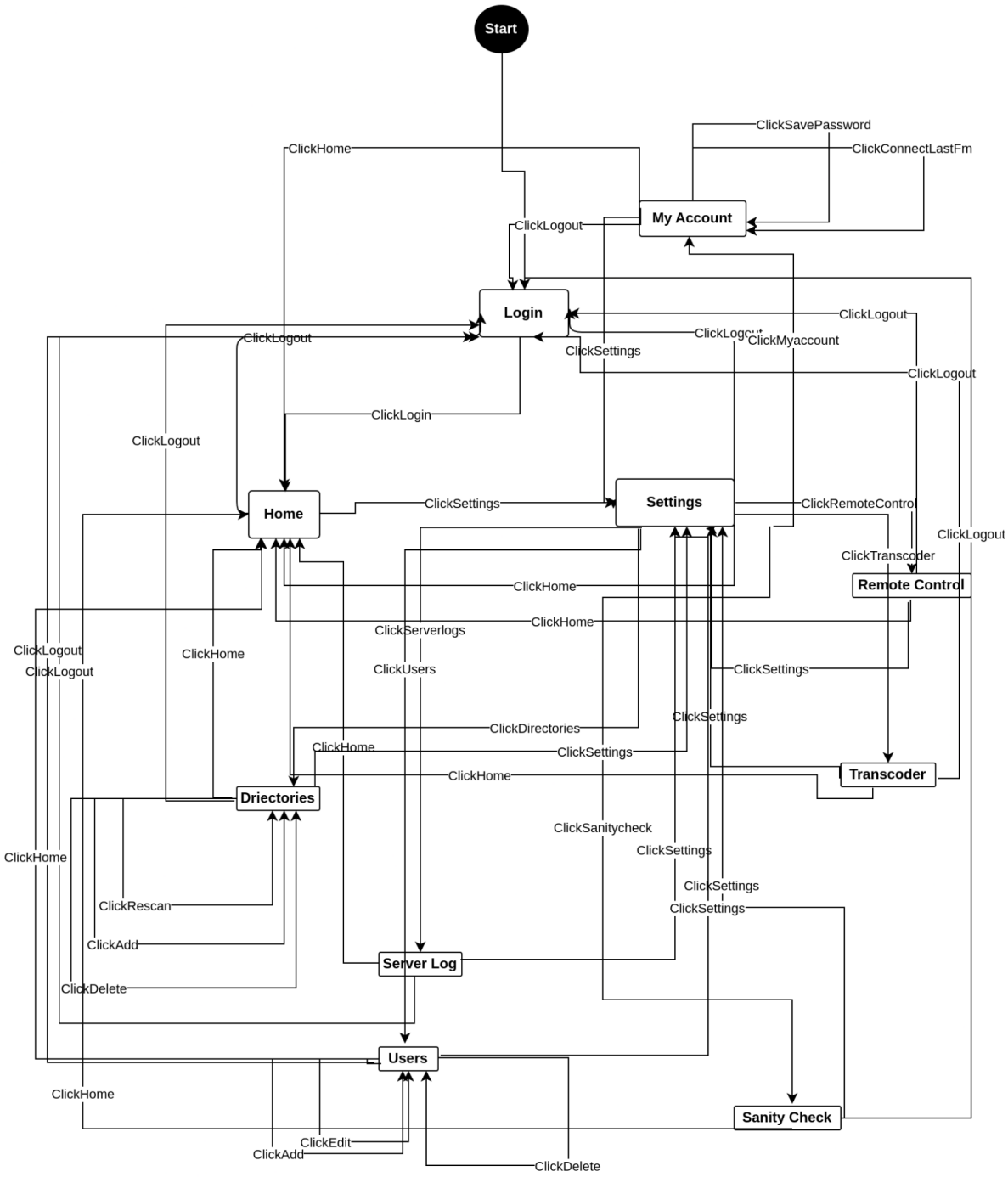
f(Users,ClickSettings)=Settings

Display Map

h(Directories)=DisplayNotification
h(Users)=DeletionConfirmationPopup

State/Action	ClickLogin	ClickHome	ClickLogout	ClickSettings	ClickMyAccount	ClickConnectLastFm	ClickSavePassword	ClickRemoteControl	ClickDirectories	Clickrescan	clickAdd	ClickDelete	ClickEdit	Clicktranscoder	ClicksanityCheck	ClickUsers	ClickServerLog
Login	Home																
Home			Login	Settings													
Settings		Home	Login		MyAccount			Remote Control	Directories					Transcoders	Sanity Check	Users	Server Log
MyAccount		Home	Login	Settings		MyAccount	MyAccount										
Remote Control		Home	Login	Settings													
Directories		Home	Login	Settings						Directories	Directories	Directories					
Transcoder		Home	Login	Settings													
Sanity Check		Home	Login	Settings													
Server Log		Home	Login	Settings													
Users		Home	Login	Settings							Users	Users	Users				

Transition Diagram


Start
ClickSavePassword
ClickHome
ClickConnectLastFm
My Account
ClickLogout
Login
ClickLogout
ClickLogout
ClickMyaccount
ClickSettings
ClickLogout
ClickLogin
ClickLogout
Settings
Home
ClickSettings
ClickRemoteControl
ClickLogout
ClickTranscoder
Remote Control
ClickHome
ClickHome
ClickServerlogs
ClickLogout
ClickLogout
ClickHome
ClickUsers
ClickSettings
ClickSettings
ClickDirectories
ClickHome
ClickSettings
Transcoder
ClickHome
Driectories
ClickSanitycheck
ClickSettings
ClickHome
ClickSettings
ClickRescan
ClickSettings
ClickAdd
Server Log
ClickDelete
Users
ClickHome
Sanity Check
ClickEdit
ClickAdd
ClickDelete

Transition System for Library management

For the six tuple {X,X0,U,f,Y,h} for this system,

X={Login,Home,MyMusic,Album,Artist, Track,ChangeArc, TrackQueue, Playlist,Add Music, UploadMusic,External Source, Add imported Music},

X0={Login} ,

U={ClickHome,ClickLogin,ClickLogout,ClickAlbum, ClickArtist, ClickLatestAlbum , ClickMostplayed, ClickCreatePlaylist, ClickAddToPlaylist,ClickPlay, ClickEditTags, ClickchangeArc, ClickUpload,ClickDownload,ClickSearch,ClickNowplaying, ClickClear}

Y={SongAddedPopup , Liked}

f(Login,ClickLogin)=Home

f(Home,ClickLogout)=Login

f(Home,ClickMyMusic)=MyMusic

f(MyMusic,ClickAlbum)=Album

f(MyMusic,ClickArtist)=Artist

f(MyMusic,ClickLogout)=Login

f(MyMusic,ClickHome)=Home

f(Album,ClickTrack)=Track

f(Album,ClickLatestAlbum)=Album

f(Album,ClickMostplayed)=Album

f(Album,ClickHome)=Home

f(Album,ClickLogout)=Login

f(Artist,ClickTrack)=Track

f(Artist,ClickHome)=Home

f(Artist,ClickLogout)=Login

f(Artist,ClickLatestAlbum)=Album

f(Artist,ClickMostPlayed)=Album

f(Track, ClickCreateplaylist)=Playlist

f(Track,ClickAddToPlaylist)=Track

f(Track,ClickPlay)=Track

f(Track,ClickeditTags)=Track

f(Track,Clickchangearc)=ChangeArc

f(Track,ClickHome)=Home

f(Track,ClickLogout)=Login

f(ChangeArc,ClickUpload)=ChangeArc

f(ChangeArc,Clickdownload)=ChangeArc

f(ChangeArc,ClickSearch)=ChangeArc

f(ChangeArc,ClickHome)=Home

f(ChangeArc,ClickLogout)=Login

f(Home,ClickNowplaying)= TrackQueue

f(TrackQueue,ClickAddToPlaylist)=TrackQueue

f(TrackQueue,Clickcreateplaylist)=Playlist

f(TrackQueue,ClickClear)=TrackQueue

f(TrackQueue,ClickHome)=Home

f(TrackQueue,ClickLogout)=Login

f(Playlist,ClickHome)=Home

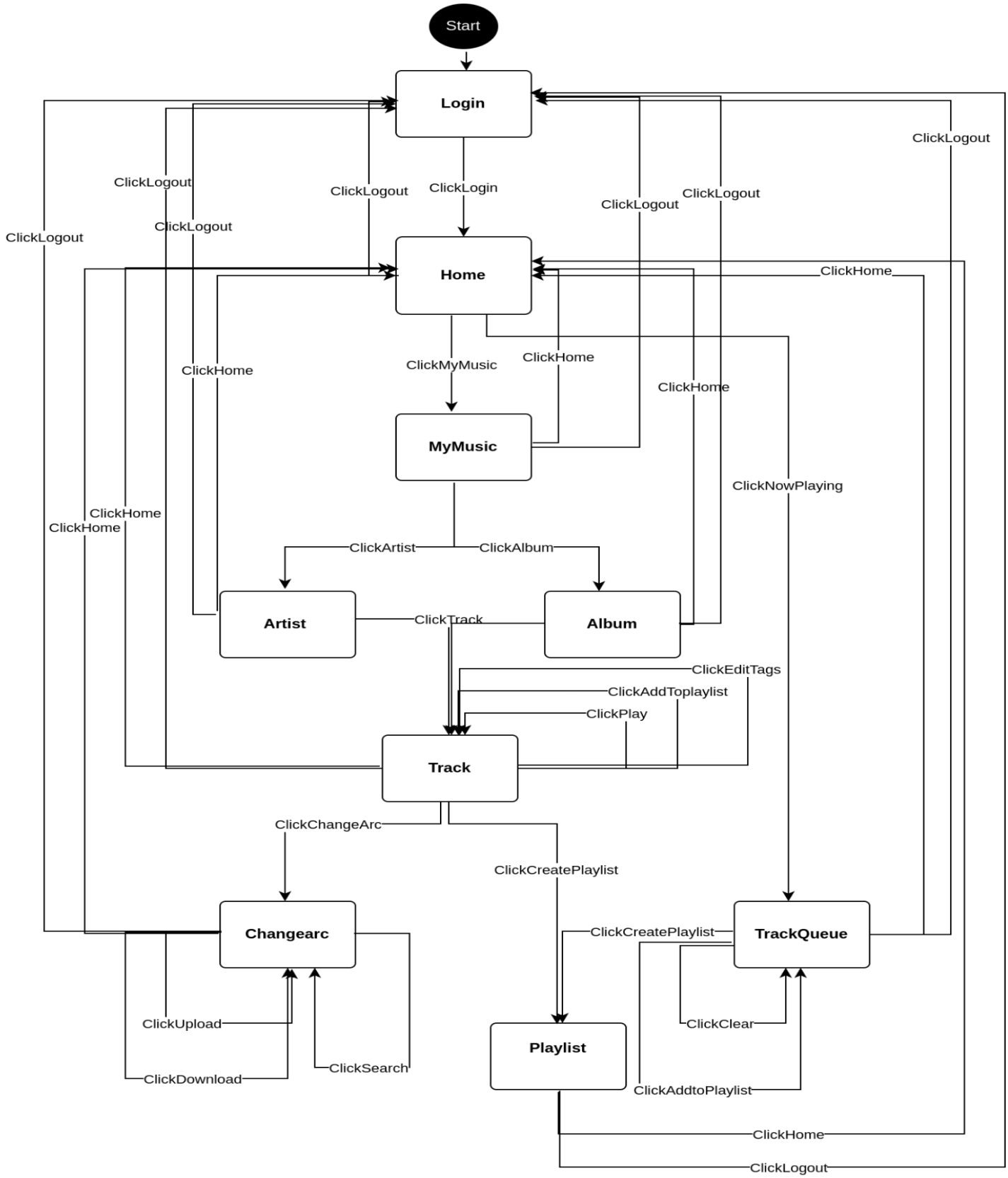
f(Playlist,ClickLogout)=Logout

Display Map

h(TrackQueue)=SongAddedPopup
h(Track)=LIked

Transition diagram

State/Action	ClickLogin	ClickHome	ClickLogout	ClickMyMusic	ClickAlbum	ClickArtist	ClickLatestAlbum	ClickMostPLayed	ClickTrack	ClickCreateplaylist	ClickAddToplaylist	ClickPlay	ClickEditTags	ClcikChangeArc	ClickUpload	ClickDownload	ClickSearch	ClickNowPlaying	ClickClear
Login	Home																		
Home			Login	MyMusic														TrackQueue	
MyMusic		Home	Login		Album	Artist													
Album		Home	Login				Album	Album	Track										
Artist		Home	Login				Album	Album	Track										
Track		Home	Login							Playlist	Track	Track	Track	ChangeArc					
ChangeArc		Home	Login												ChangeArc	ChangeArc	ChangeArc		
TrackQueue		Home	Login							Playlist	TrackQueue								TrackQueue
Playlist		Home	Login																


Start
Login
Home
MyMusic
Artist
Album
Track
Changearc
TrackQueue
Playlist
ClickLogin
ClickMyMusic
ClickArtist
ClickAlbum
ClickTrack
ClickChangeArc
ClickCreatePlaylist
ClickNowPlaying
ClickEditTags
ClickAddToplaylist
ClickPlay
ClickUpload
ClickDownload
ClickSearch
ClickClear
ClickAddtoPlaylist
ClickHome
ClickLogout

Transition System for LastFm

For the six tuple {X,X0,U,f,Y,h} for this system,

X={Login,Home,Settings,MyAccount,LastFm},

X0={Login} ,

U={ClickHome,ClickLogin,ClickLogout,ClickSettings,ClickMyAccount,
ClickConnectlastfm,Clicklastfm }

Y={ConnectionCreationMessage}

f(Login,ClickLogin)=Home,

f(Home,ClickSettings)=Settings

f(Home,ClickLogout)=Login

f(Settings,ClickMyAccount)=MyAccount

f(MyAccount,Clicklastfm)=LastFm

f(LastFm,ClickConnectlastfm)=LastFm

f(MyAccount,ClickSettings)=Settings

f(LastFm,ClickHome)=Home

f(LastFm,ClickLogout)=Login

f(LastFm,ClickSettings)=Settings

f(MyAccount,ClickHome)=Home

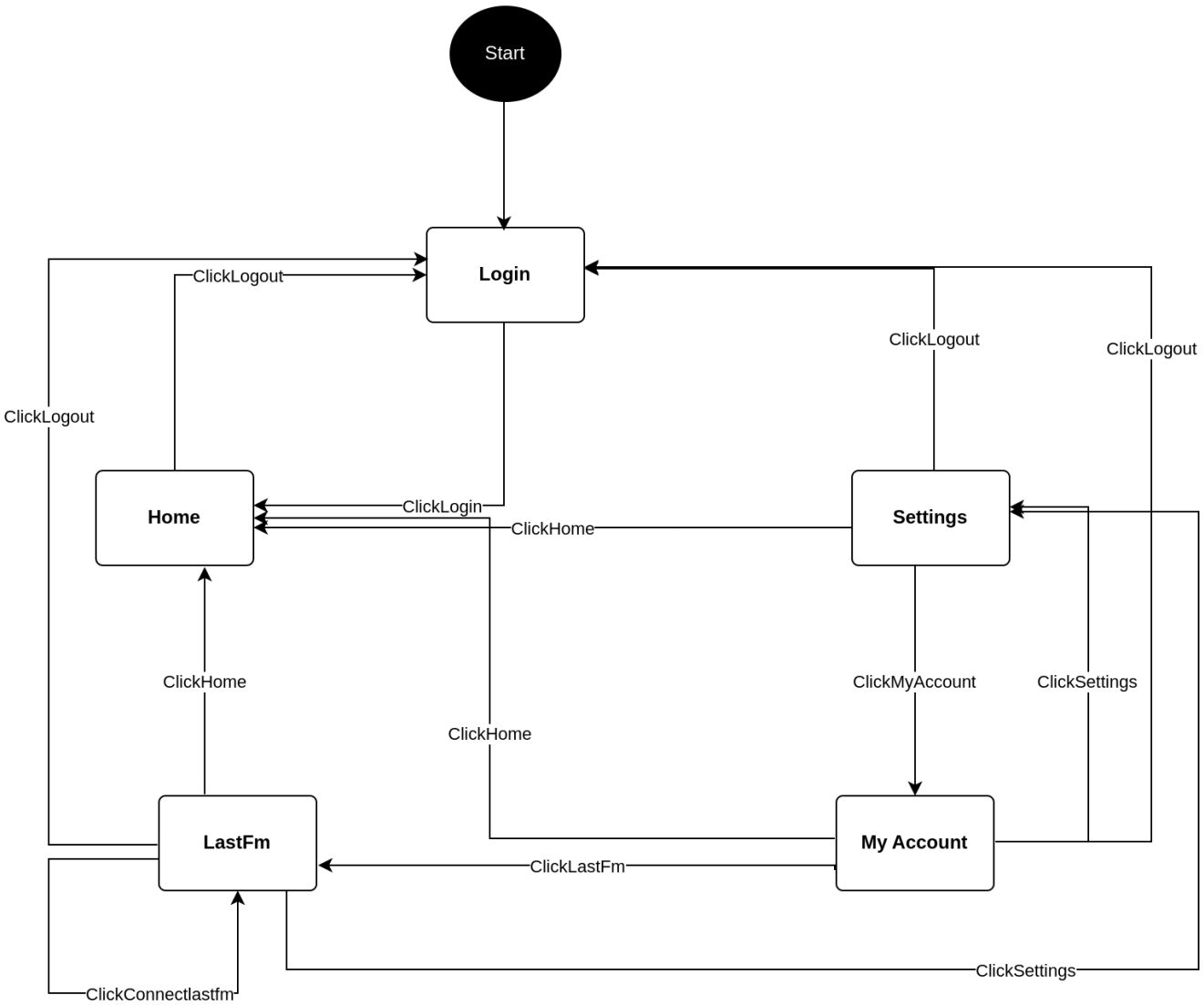
f(MyAccount,ClickLogout)=Login

Display map:

h(LastFm)=ConnectionCreationMessage

State/Action	ClickLogin	ClickHome	ClickLogout	ClickSettings	ClickMyaccount	Clicklastfm	ClickConnectlastfm
Login	Home						
Home			Login	Settings			
MyAccount		Home	Login	Settings		LastFm	
Settings		Home	Login		MyAccount		
LastFm		Home	Login	Settings			LastFm

Transition Diagram



3E: Refactoring

Some Probable Ideas that can be implemented to achieve automatic refactoring

- While writing the code of the program or reading the code in any environment, if a function has long method smell , then it could suggest and indicate the smell.
- We have to write the python script to find the duplicate code and also write the script to make one module of the duplicate code and use this code in other place.
- We can write our custom scripts to find line of code in particular class and is the line of code is greater the threshold value then it show warning class/method is too long