%LONHQW8 QLYHUVLW

Department of Computer Engineering

# &6 ' DWDEDVH6\ VWHP V3 URMHFW

ê7 UDFNE\ 0 Hë

## 3 URMHFW' HVLJQ5 HSRUWb

## 3 URMHFW* URXS1 XP EHU b

## 3 URMHFW* URXS0 HP EHUV b

* ¸ NFDQ' HáLLUP HQFL2 QXU6¸ QP H] ) DWLK7 D! 2 U©XQ<D©È Q

6XSHUYLVRU &RXUVH,QWUXFWRU $ VWW3 URI ' U+DP GL' LEHNOR á OXb

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6XEP LWHGDW1 RYHP EHU

&RQWHQWV


Â•.IpQlG›.!]GlY Ä

Ã•.IY‹jQ[ /EPIZ<h Æ

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ÃÂÃ• dQ]Gl¢]ZZI[j ÂÄ

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Å• k[EjQ[<Y]Zd][I[jh ÃÈ

ÅÂ1hI <hIh›/El[<gQh ÃÈ

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ÅÄ <j</jgkEjkgJh¥<j<0sdIh ÃÊ

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Æ•Ç1hlg+gjNQY ÅÅ
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Æ•É ]Zld<Ol ÅÈ
Æ•Ê! lGQqZ ÆÂ
Æ•ÂÁ <Y[G<g6Qq ÆÃ
Æ•ÂÂ GZQ <hPD]<gG ÆÄ
Æ•ÂÂ•Â• gl<jl"lq06/P]q ÆÆ
Æ•ÂÂ•Ã• gl<jl"lq!]pQ ÆÇ
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Æ•ÂÈ•!]GQs› lYjl <hj ÇÃ
Æ•ÂÉ•!]GQs› lYjl!lGQqZ ÇÃ
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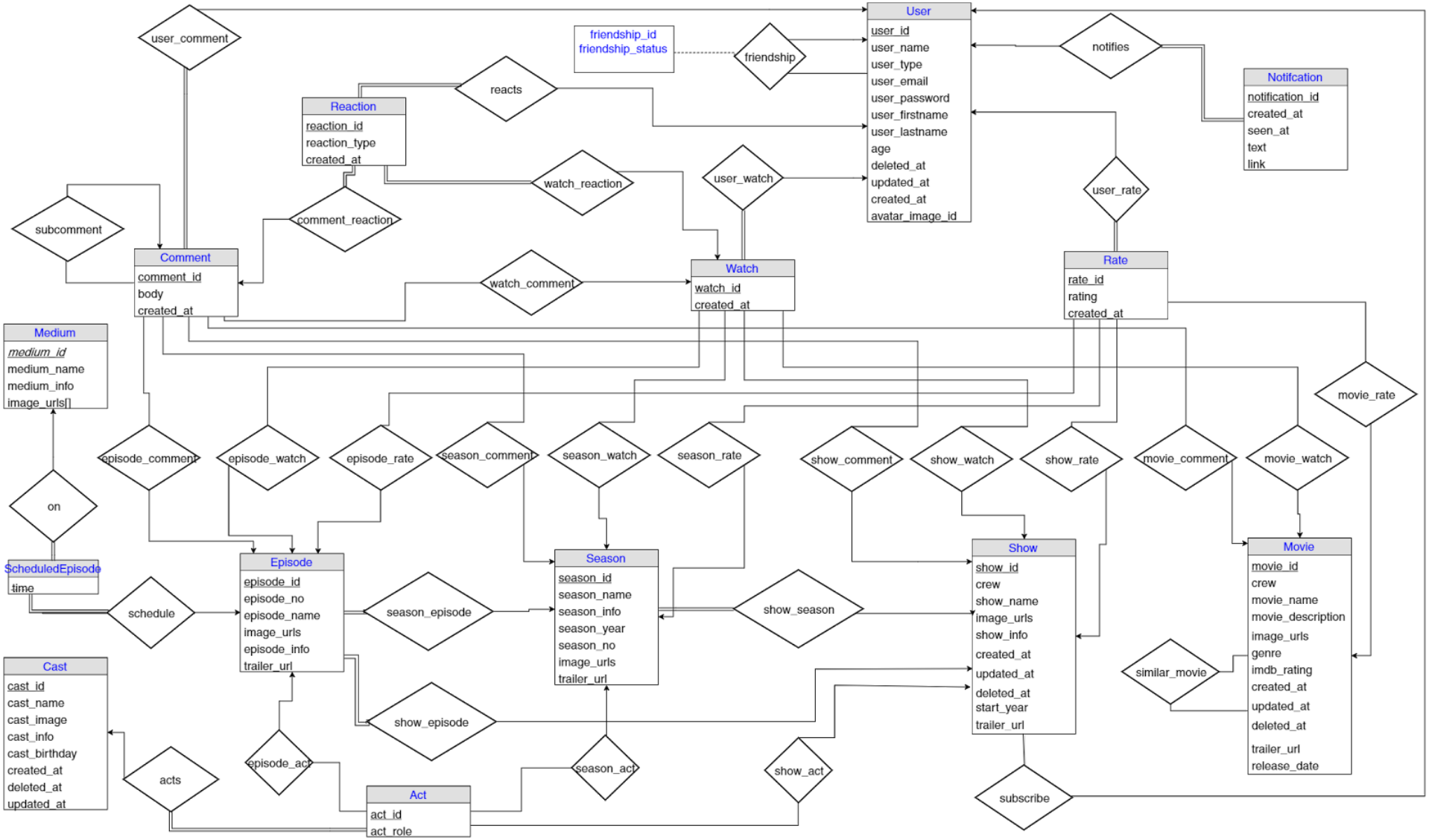
È• ZdYZl[j<jQ[ +Y<[ ÇÆ

# 5 HYLVHG ( 5 0 RGHO

$ FFRUGLQJ VR DVVLVWDQWV UHYLHZ Z H UHYLVHG RXU ( 5 P RGHOE\ IROORZ LQJ JXLGHOQHV JLYHQ VR XV

- ,QILUVWSKDVH Z H XVHG ORW RI Z HDN HQWLW P RGHO $ IWMUUHYLHZ Z H XVHG VRWDO SDUWLFLSDWRQ LQVWMDG RI Z HDN HQWLW
- : H UHP RYHG LQWMUDFHV IURP ( 5 GLDJUDP DQG FRQQHFWMG DOOHQWLWHV Z LWK VHSDUDWM UHODWRQ VR HDFK RWKHUDV VXJJHVWMG
- : H DGGHG QRWLFDWRQ P RGHOVR ( 5 GLDJUDP VLQFH Z H QHHG VR QRWL\ XVHUV Z KHQ DQ\ DFWLYLW RUHYHQWUHODWMG VR XVHUDFWLYLWHV DULVH
- : H LQFOXGHG VRP H UHGXQGDQWRUHLJQ NH\ V LQ HQWLW P RGHOV E\ XQGHUODQLQJ WKHP DV GDVKHG ,Q WKLV YHUVLRQ Z H XSGDWMG WKLV VRR DQG UHP RYHG XQQHFHVVDU\ DWWLEXWMV
- : H DOVMUHG $ UWLWWDEOH VR & DVWDEOH VLQFH P RUH JHQHUF RQH LV UHTXLUHG VR VXSSRUWDOO FDVWLQFOXGLQJ VFHQDULVW DUWLWW GLUHFVRUV HWF
- : H SXVWHSDUDWM UHODWRQ IRUVLP LODUP RYLHV LQWMDG RI LQFOXGLQJ LWLQ WDEOH GHILQLWRQ RI P RYLH DV VWLQJ DUUD\
- $ OVR HSLVRGH KDV UHODWRQ Z LWK WKH VKRZ DV Z HOODV VHDVRQ DIWMUXSGDWM : H QHHG VR NQRZ Z KLFK WY VKRZ RZ QV WKH HSLVRGH 7KDWLV Z K\ Z H DGGHG WKLV UHODWRQ VR ( 5 GLDJUDP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season_no
image_urls
trailer_url
show_season
Show
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movie_name
movie_description
image_urls
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imdb_rating
created_at
updated_at
deleted_at
trailer_url
release_date
similar_movie
Cast
cast_id
cast_name
cast_image
cast_info
cast_birthday
created_at
deleted_at
updated_at
show_episode
acts
episode_act
season_act
show_act
Act
act_id
act_role
subscribe

# 5 HODWLRQ 6 FKHP DV

” 1 RWH WKDW ZH XVHG 8 3 3 ( 5 &$6 ( FKDUDFWHUV IRU IRUHLJQ NH\ V VLQFH GRFV GRHV QRW HQDEOH WR SXWGDVKHG RQHV

## 6 KRZ

5 HODWLRQDO0 RGHO

6 KRZ VKRZ BLG $&7 B,' VKRZ BQDP H VKRZ BLQ R VWDUW\ HDU
LP DJHBXUO VWDWLRBXUO FUHDWHGBDW XSGDWHGBDW

) XQFWLRQDO HSHQGHQFLHV

VKRZ BLG ! DFWRLG VKRZ BQDP H VKRZ BLQ R VWDUW\ HDU LP DJHBXUO
WDWLRBXUO FUHDWHGBDW XSGDWHGBDW

&DQGLGDWH . H\ V
^^VKRZ BLG``

1 RUP DO) RUP
%&1 )

7DEOH ' HILQLWLRQ

&5 ( $7( 7$%/ ( VKRZ
VKRZ BLG ,17( * ( 5 1 2 7 1 8 // $8 72 B,1 &5 ( 0 ( 17
VKRZ BQDP H 9$5 &+$5 1 2 7 1 8 //
VKRZ BLQ R 9$5 &+$5
VWDUW\ HDU ,17( * ( 5
LP DJHBXUO 7( ; 7
WDWLRBXUO 9$5 &+$5
FUHDWHGBDW 7,0 ( 67$0 3
XSGDWHGBDW 7,0 ( 67$0 3
) 25 ( ,* 1 . ( < DFWRLG UHIHUHQFHV $&7 DFWRLG 21 ' (/ / 7( &$6&$' (
35 ,0 $5 < . ( < VKRZ BLG

# 6HDVRQ

5HODWLRQDO0RGHO
6HDVRQ VHDVRQBLG 6+2: B,' $&7B,' HSLVRGHBQDPH VHDVRQBQR VHDVRQBLQIR
VHDVRQB\HDU LP DJHBXUOY WDLOHUBXUO

)XQFWLRQDO'HSHQGHQFLHV

VHDVRQBLG ! VKRZBLG DFWBLG HSLVRGHBQDPH VHDVRQBQR VHDVRQBLQIR
VHDVRQB\HDU LP DJHBXUOY WDLOHUBXUO

&DQGLGDWH.H\V

1RUP DO)RUP %&1)

7DEOH'HILQLWLRQ

&5($7( 7$%/( VHDVRQ
VHDVRQBLG ,17(*(5 127 18// $872B,1&5(0(17
HSLVRGHBQDPH 9$5&+$5 127 18//
VHDVRQBQR ,17(*(5 127 18//
VHDVRQBLQIR 9$5&+$5
VHDVRQB\HDU ,17(*(5
LP DJHBXUOY 7(;7
WDLOHUBXUO 9$5&+$5
DFWBLG ,17(*(5
VKRZBLG ,17(*(5
)25(,*1.(<VKRZBLG UHIHUHQFHV6+2: VKRZBLG 21'(/(7(
&$6&$'(
)25(,*1.(<DFWBLG UHIHUHQFHV$&7DFWBLG
35,0$5<.(<VHDVRQBLG

# ( SLVRGH

5 HODWRQDOO RGHO

```
        ( SLVRGH HSLVRGHBLG 6+2: B,'  6($621B,'  $&7B,'
              HSLVRGHBQR HSLVRGHBQDP H LP DJHBXUOY HSLVRGHBLQR WDUJHWBXUO

) XQFWRQDO HSHQGHQFLHV
        HSLVRGHBLG ! HSLVRGHBQR HSLVRGHBQDP H LP DJHBXUOY HSLVRGHBLQR
WDUJHWBXUO

&DQGLGDWH. H\V

^^HSLVRGHBLG``

1RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( HSLVRGH
        HSLVRGHBLG          ,17(*(5  127 18// $872B,1&5(0(17
        HSLVRGHBQR          ,17(*(5  127 18//
        HSLVRGHBQDP H       9$5&+$5     127 18//
        LP DJHBXUOY         7(;7
        HSLVRGHBLQR         9$5&+$5
        WDUJHWBXUO          9$5&+$5
        VHDVRQBLG           ,17(*(5
        VKRZBLG            ,17(*(5
        )25(,*1.(< VHDVRQBLG UHIHUHQFHV6($621 VHDVRQBLG 21 '(/(7(
        &$6&$' (
        )25(,*1.(< VKRZBLG UHIHUHQFHV6+2: VKRZBLG 21 '(/(7(
        &$6&$' (
        )25(,*1.(< DFWBLG UHIHUHQFH$&7 DFWBLG 21 '(/(7( &$6&$' (
        35,0$5<.(< HSLVRGHBLG
```

## 0 RYLH

### 5 H O D W 0 R Q E O

0 RYLH P RYLHBLG P RYLHBQDP H P RYLHBGHVFULSWRQ
JHQUH LP GEBUDWQJ VWDLOHUBXUO UHDVHBGDWD XSGDWHGBDWFUHDWHGBDW

) XQFWLRQDO HSHQGHQFLHV
P RYLHBLG ! P RYLHBQDP H P RYLHBGHVFULSWRQ JHQUH LP GEBUDWQJ LP DJHBXUOV
UHOHDVHBGDWD VWDLOHUBXUO XSGDWHGBDWFUHDWHGBDW

&DQGLGDWH. H\V

^^P RYLHBLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5( \$7( 7\$%/( P RYLH
P RYLHBLG ,17(*(5 127 18// \$872B,1&5(0(17
P RYLHBQDP H 9\$5&+\$5 127 18//
LP DJHBXUOV 7(;7
P RYLHBGHVFULSWRQ 9\$5&+\$5
VWDLOHUBXUO 9\$5&+\$5
35,0 \$5<.(< P RYLHBLG

## 6 LP LODUB0 RYLH

5 HDWXUDO0 RGHO

6 LP LODUB0 RYLH ILLVWBP RYLHBLG VHFRQGBP RYLHBLG

) XQFWLRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\V

^^ILLVWBP RYLHBLG VHFRQGBP RYLHBLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWRQ
&5($7( 7$%/( VLP LODUBP RYLH
ILLVWBP RYLHBLG ,17(*(5 127 18//
VHFRQGBP RYLHBLG ,17(*(5 127 18//
)25(,*1.(< ILLVWBP RYLHBLG UHIHUHQFHV029,( P RYHBLG
21'(/(7( &$6&$'(
)25(,*1.(< VHFRQGBP RYLHBLG UHIHUHQFHV5$7( P RYLHBLG
21'(/(7( &$6&$'(
35,0$5<.(< ILLVWBP RYLHBLG VHFRQGBP RYLHBLG

$FW

5HODWRQDO0RGHO

$FWDFWBLG 3(56211(/B,' DFWBUROH

)XQFWRQDO HSHQGHQFLHV
DFWBLG ! SHUVRQQHOBLG DFWBUROH

&DQGLGDWH.H\V

^^DFWBLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWRQ
&5($7( 7$%/( DFW
DFWBLG ,17(*(5 127 18// $872B,1&5(0(17
DFWBUROH 9$5&+$5 &+(&.
DFWBUROH ,1 µ$UWLVW¶µ1 LUHFWRU¶µ6FHQDULVW¶µ2 WKHU¶
FDVWBLG ,17(*(5 127 18//
)25(,*1.(< FDVWBLG UHIHUHQFHV&$67 FDVWBLG
21'(/(7( &$6&$'(
35,0$5<.(< DFWBLG

# &DVW

5HODWLRQDO RGHO

&DVWFDVWBLG FDVWBQDPH FDVWBLP DJH FDVWBLQR FDVWBELUWKGD\ FUHDWHGBDW XSGDWHGBDW

)XQFWLRQDO HSHQGHQFLHV

FDVWBLG ! FDVWBQDPH FDVWBLQR FDVWBLP DJH FDVWBELUWKGD\ FUHDWHGBDW XSGDWHGBDW

&DQGLGDWH. H\V

^^FDVWBLG``

1RUP DO)RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( FDVW
FDVWBLG ,17(*(5 127 18// $872B,1&5(0(17
FDVWBQDPH 9$5&+$5 127 18//
FDVWBLP DJHBXQD 9$5&+$5
FDVWBLQR 9$5&+$5
FDVWBELUWKGD\ 7,0(67$03
FUHDWHGBDW 7,0(67$03
XSGDWHGBDW 7,0(67$03
35,0$5<.(<SHUVRQQHOBLG

# 6 FKHGXOHGB( SLVRGH

5 HODWRQDO0 RGHO

6 FKHGXOHGB( SLVRGH ( 3,62 ' ( B,' 0 ( ' ,80 B,' WPH

) XQFWRQDO HSHQGHQFLHV
HSLVRGHBLG P HGLXP BLG ! WPH

& DQGLGDWH . H\ V

^^HSLVRGHBLG P HGLXP BLG``

1 RUP DO) RUP
%&1 )

7 DEOH ' HILQLWRQ
&5 ( $7( 7$%/ ( VFKHGXOHGBHSLVRGH
WPH 7,0 ( 67$0 3
HSLVRGHBLG ,17( * ( 5 127 18 / /
P HGLXP BLG ,17( * ( 5 127 18 / /
) 25 ( ,* 1 . ( < HSLVRGHBLG UHIHUHQFHV ( 3,62 ' ( HSLVRGHBLG
) 25 ( ,* 1 . ( < P HGLXP BLG UHIHUHQFHV 0 ( ' ,80 P HGLXP BLG

## 0 HGLXP

5 HODWRQDO0 RGHO

0 HGLXP P HGLXP BLG P HGLXP BQDP H P HGLXP BLQIR LP DJHBXUDY

) XQFWRQDO HSHQGHQFLHV

HSLVRGHBLG ! HSLVRGHBQR HSLVRGHBQDP H LP DJHBXUDY HSLVRGHBLQIR WDUJHWBXUO

&DQGLGDWH. H\V

^^P HGLXP BLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWRQ
&5(\$7( 7\$%/( P HGLXP
P HGLXP BLG ,17(*(5 127 18// \$872B,1&5(0(17
P HGLXP BQDP H 9\$5&+\$5 127 18//
P HGLXP BLQIR 9\$5&+\$5
LP DJHBXUDY 7(;7
35,0\$5<.(< P HGLXP BLG

## &RP P HQW

5 HODWRQDO0 RGHO

&RP P HQWFRP P HQWBLG 3\$5(17B,' 86(5B,' ERGY FUHDWHGBDW

) XQFWRQDO HSHQGHQFLHV

FRP P HQWBLG ! SDUHQWBLG XVHUBLG ERGY FUHDWHGBDW

&DQGLGDWH. H\V

^^FRP P HQWBLG``

1 RUP DO) RUP
%&1)

```
7DEOH' HILQLWRQ
&5($7( 7$%/( FRPPHQWV
        FRPPHQWBLG          ,17(*(5 127 18// $872B,1&5(0(17
        ERG\                9$5&+$5     127 18//
        FUHDWHGBDW          7,0(67$03
        XVHUBLG             ,17(*(5 127 18//
        SDUHQWBLG           ,17(*(5
        )25(,*1.(< SDUHQWBLG UHIHUHQFHV&200(17 FRPPHQWBLG
        )25(,*1.(< XVHUBLG UHIHUHQFHV86(5 XVHUBLG
        35,0$5<.(< FRPPHQWBLG
```

## 6KRZ B&RPPHQWV

```
5HODWLRQDO0RGHO

        6KRZB&RPPHQWVWKRZBID FRPPHQWBLG

)XQFWLRQDO'HSHQGHQFLHV
        1RGHSHQGHQF\

&DQGLGDWH.H\V

^^VKRZBID FRPPHQWBLG``

1RUPDO)RUP
%&1)

7DEOH' HILQLWRQ
&5($7( 7$%/( VKRZBFRPPHQWV
        VKRZBID             ,17(*(5 127 18//
        FRPPHQWBLG          ,17(*(5 127 18//
        )25(,*1.(< VKRZBID UHIHUHQFHV6+2:
        )25(,*1.(< FRPPHQWBLG UHIHUHQFHV&200(17
        35,0$5<.(< FRPPHQWBLG VKRZBID
```

# ( SLVRGHB&RPP HQW

5 HODWRQDOO RGHO

( SLVRGHB&RPP HQWHSLVRGHBLG FRPP HQWBLG

) XQFWRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\ V

^^HSLVRGHBLG FRPP HQWBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWRQ
&5( $7( 7$%/( HSLVRGHBFRPP HQW
HSLVRGHBLG ,17( * ( 5 127 18//
FRPP HQWBLG ,17( * ( 5 127 18//
) 25( ,* 1 . ( < HSLVRGHBLG UHIHUHQFHV ( 3,62' (
21 ' (/ ( 7( &$6&$' (
) 25( ,* 1 . ( < FRPP HQWBLG UHIHUHQFHV &200( 17
21 ' (/ ( 7( &$6&$' (
35,0 $5< . ( < FRPP HQWBLG HSLVRGHBLG

# 6HDVRQB&RPPHQWV

5HODWLRQDO0RGHO

6HDVRQB&RPPHQWVWHDVRQBLG FRPPHQWBLG

)XQFWLRQDO'HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V

^^VHDVRQBLG FRPPHQWBLG``

1RUPDO)RUP
%&1)

7DEOH'HILQLWLRQ
&5($7( 7$%/( VHDVRQBFRPPHQWV
VHDVRQBLG ,17(*(5 127 18//
FRPPHQWBLG ,17(*(5 127 18//
)25(,*1.(< VHDVRQBLG UHIHUHQFHV6($621
21'(/(7( &$6&$'(
)25(,*1.(< FRPPHQWBLG UHIHUHQFHV&200(17
21'(/(7( &$6&$'(
35,0$5<.(< FRPPHQWBLG VHDVRQBLG

# 0 RYLHB&RP P HQW

5 HODWRQDO0 RGHO

0 RYLHB&RP P HQWP RYLHBLG FRP P HQWBLG

) XQFWRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH . H\ V

^^P RYLHBLG FRP P HQWBLG``

1 RUP DO) RUP
%&1 )

7DEOH ' HILQLWRQ
&5 ( $7( 7$%/ ( P RYLHBFRP P HQW
P RYLHBLG ,17( * ( 5 127 18//
FRP P HQWBLG ,17( * ( 5 127 18//
) 25 ( ,* 1 . ( < P RYLHBLG UHIHUHQFHV 0 2 9,(
2 1 ' ( / ( 7( &$6&$' (
) 25 ( ,* 1 . ( < FRP P HQWBLG UHIHUHQFHV &2 0 0 ( 1 7
2 1 ' ( / ( 7( &$6&$' (
3 5 ,0 $5 < . ( < FRP P HQWBLG P RYLHBLG

# 5 HDFWRQ

5 HODWRQDO0 RGHO

5 HDFWRQ UHDFWRQBLG UHDFWRQB\\SH FUHDWHGBDW

) XQFWRQDO HSHQGHQFLHV
UHDFWRQBLG ! UHDFWRQB\\SH FUHDWHGBDW

&DQGLGDWH . H\ V

^^UHDFWRQBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWRQ
&5($7(7$%/(UHDFWRQ
UHDFWRQBLG ,17(*(5 127 18// $872B,1&5(0(17
UHDFWRQBWVSH 9$5&+$5 127 18//
XVHUBLG ,17(*(5 127 18//
FUHDWHGBDW 7,0(67$03
)25(,*1.(<XVHUBLG UHIHUHQFHV86(5 21'(/(7(&$6&$'(
35,0$5<.(<UHDFWRQBLG

&RPPHQWB5HDFWRQ

5HODWRQDO0RGHO

&RPPHQWB5HDFWRQ FRPPHQWBLG UHDFWRQBLG

)XQFWRQDO HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V

^^FRPPHQWBLG UHDFWRQBLG``

1RUPDO)RUP
%&1)

7DEOH' HILQLWRQ
&5($7(7$%/(FRPPHQWBUHDFWRQ
FRPPHQWBLG ,17(*(5 127 18//
UHDFWRQBLG ,17(*(5 127 18//
)25(,*1.(<FRPPHQWBLG UHIHUHQFHV&200(17
21'(/(7(&$6&$'(
)25(,*1.(<UHDFWRQBLG UHIHUHQFHV5($&7,21
21'(/(7(&$6&$'(
35,0$5<.(<FRPPHQWBLG UHDFWRQBLG

## : DWWKB5 HDFWRQ

5 HODWRQDO0 RGHO

: DWWKB5 HDFWRQ Z DWWKBLG UHDFWRQBLG

) XQFWRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\ V

^^Z DWWKBLG UHDFWRQBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWLRQ
&5( $7( 7$%/( Z DWWKBUHDFWRQ
Z DWWKBLG ,17(*(5 127 18//
UHDFWRQBLG ,17(*(5 127 18//
) 25( ,* 1 .( < Z DWWKBLG UHIHUHQFHV: $7&+
21 ' (/(7( &$6&$' (
) 25( ,* 1 .( < UHDFWRQBLG UHIHUHQFHV5( $&7,21
21 ' (/(7( &$6&$' (
35,0 $5< .( < Z DWWKBLG UHDFWRQBLG

## : DWWK

5 HODWRQDO0 RGHO

: DWWK Z DWWKBLG 86( 5B,' FUHDWHGBDW

) XQFWRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\ V

^^Z DWWKBLG``

1 RUP DO) RUP
%&1 )

```
7DEOH' HILQLWLRQ
&5($7( 7$%/( ZDWFK
        ZDWFKBLG            ,17(*(5 127 18// $872B,1&5(0(17
        XVHUBLG             ,17(*(5 127 18//
        )25(,*1.(<XVHUBLG UHIHUHQFHV86(5
        21'(/(7( &$6&$'(
        35,0$5<.(<ZDWFKBLG
```

## 6HDVRQB: DWFK

```
5HODWLRQDO0RGHO
```

6HDVRQB: DWFK ZDWFKBLG VHDVRQBLG

```
)XQFWLRQDO'HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V

^^ZDWFKBLG VHDVRQBLG``

1RUP DO)RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( VHDVRQBZDWFK
        ZDWFKBLG            ,17(*(5 127 18//
        VHDVRQBLG           ,17(*(5 127 18//
        )25(,*1.(<ZDWFKBLG UHIHUHQFHV: $7&+
        21'(/(7( &$6&$'(
        )25(,*1.(<VHDVRQBLG UHIHUHQFHV6($621
        21'(/(7( &$6&$'(
        35,0$5<.(<ZDWFKBLG VHDVRQBLG
```

## (SLVRGHB: DWFK

```
5HODWLRQDO0RGHO
```

(SLVRGHB: DWFK ZDWFKBLG HSLVRGHBLG

```
)XQFWLRQDO'HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V
```

```
^^Z DWWKBLG HSLVRGHBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWRQ
&5( $7( 7$%/( HSLVRGHBZ DWWK
        Z DWWKBLG            ,17(*(5 127 18//
        HSLVRGHBLG          ,17(*(5 127 18//
        )25(,*1.(<Z DWWKBLG UHIHUHQFHV: $7&+
        21 '(/(7( &$6&$'(
        )25(,*1.(<HSLVRGHBLG UHIHUHQFHV(3,62'(
        21 '(/(7( &$6&$'(
        35,0 $5<.(<Z DWWKBLG HSLVRGHBLG
```

## 0 RYLHB: DWWK

```
5 HODWLRQDO0 RGHO

0 RYLHB: DWWK Z DWWKBLG P RYLHBLG

) XQFWLRQDO' HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\V

^^Z DWWKBLG P RYLHBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWRQ
&5( $7( 7$%/( P RYLHBZ DWWK
        Z DWWKBLG            ,17(*(5 127 18//
        P RYLHBLG           ,17(*(5 127 18//
        )25(,*1.(<Z DWWKBLG UHIHUHQFHV: $7&+
        21 '(/(7( &$6&$'(
        )25(,*1.(<P RYLHBLG UHIHUHQFHV029,(
        21 '(/(7( &$6&$'(
        35,0 $5<.(<Z DWWKBLG P RYLHBLG
```

## 6KRZB: DWWK

5HGDWRQDOO RGHO

6KRZB: DWWK VKRZBLG ZDWWKBLG

)XQFWLRQDO HSHQGHQFLHV
1RGHSHQGHQFLHV

&DQGLGDWH. H\V

^^VKRZBLG ZDWWKBLG``

1RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( VKRZBZDWWK
ZDWWKBLG ,17(*(5 127 18//
VKRZBLG ,17(*(5 127 18//
)25(,*1.(< ZDWWKBLG UHIHUHQFHV: $7&+
21'(/(7( &$6&$'(
)25(,*1.(< VKRZBLG UHIHUHQFHV6+2:
21'(/(7( &$6&$'(
35,0$5<.(< ZDWWKBLG VKRZBLG

## 5DWW

5HGDWRQDOO RGHO

5DWWUDWWBLG UDWLQJ FUHDWHGBDW

)XQFWLRQDO HSHQGHQFLHV
UDWWBLG ! UDWLQJ FUHDWHGBDW

&DQGLGDWH. H\V

^^UDWWBLG``

1RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( UDWW

```
UDWMBLG        ,17(*(5 127 18// $872B,1&5(0(17
XVHUBLG              ,17(*(5 127 18//
UDWQJ                ' 28%/(
FUHDWHGBDW           7,0(67$03
)25(,*1.(<XVHUBLG UHIHUHQFHV86(5 XVHUBLG
21'(/(7( &$6&$'(
35,0$5<.(<UDWMBLG
```

## 6KRZB5DWM

```
5HODWLRQDO0RGHO

6KRZB5DWMUDWMBLG VKRZBLG

)XQFWLRQDO'HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V

^^UDWMBLG VKRZBLG``

1RUP DO)RUP
%&1)

7DE0H'HILQLWLRQ
&5($7( 7$%/( VKRZBUDWM
       VKRZBLG      ,17(*(5 127 18//
       UDWMBLG      ,17(*(5 127 18//
       )25(,*1.(<VKRZBLG UHIHUHQFHV6+2: VKRZBLG
       21'(/(7( &$6&$'(
       )25(,*1.(<UDWMBLG UHIHUHQFHV5$7( UDWMBLG
       21'(/(7( &$6&$'(
       35,0$5<.(<UDWMBLG VKRZBLG
```

## 0RYLHB5DWM

```
5HODWLRQDO0RGHO

0RYLHB5DWMUDWMBLG PRYLHBLG

)XQFWLRQDO'HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH.H\V
```

```
^^UDVMBLG PRYLHBLG``

1RUPDO)RUP
%&1)

7DECH'HILQLWRQ
&5($7(7$%/(PRYLHBUDVM
        UDVMBLG                ,17(*(5 127 18//
        PRYLHBLG               ,17(*(5 127 18//
        )25(,*1.(<UDVMBLG UHIHUHQFHV5$7(UDVMBLG
        )25(,*1.(<PRYLHBLG UHIHUHQFHV029,(PRYLHBLG
        21'(/(7(&$6&$'(
        35,0$5<.(<UDVMBLG PRYLHBLG
```

## 6HDVRQB5DVM

```
5HODWRQDO0RGHO

6HDVRQB5DVM UDVMBLG VHDVRQBLG

)XQFWRQDO HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDVM.H\V

^^UDVMBLG VHDVRQBLG``

1RUPDO)RUP
%&1)

7DECH'HILQLWRQ
&5($7(7$%/(VHDVRQBUDVM
        VHDVRQBLG     ,17(*(5 127 18//
        UDVMBLG       ,17(*(5 127 18//
        )25(,*1.(<VHDVRQBLG UHIHUHQFHV86(5VHDVRQBLG
        21'(/(7(&$6&$'(
        )25(,*1.(<UDVMBLG UHIHUHQFHV5$7(UDVMBLG
        35,0$5<.(<UDVMBLG VHDVRQBLG
```

## (SLVRGHB5DVM

```
5HODWRQDO0RGHO
```

```
( SLVRGHB5 DWW UDWHBLG HSLVRGHBLG

) XQFWLRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

&DQGLGDWH. H\ V

^^UDWHBLG HSLVRGHBLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5( $7( 7$%/( HSLVRGHBUDWH
        HSLVRGHBLG          ,17(*(5 127 18//
        UDWHBLG             ,17(*(5 127 18//
        )25(,*1.(< HSLVRGHBLG UHIHUHQFHV86(5 HSLVRGHBLG
        21 '(/(7( &$6&$'(
        )25(,*1.(< UDWHBLG UHIHUHQFHV5$7( UDWHBLG
        35,0$5<.(< UDWHBLG HSLVRGHBLG
```

## 8VHU

```
5HODWLRQDO0RGHO

        8VHU XVHUBLG XVHUBQDPH XVHUBWSH XVHUBHP DLO
                XVHUBSDVZRUG XVHUBILLWWQDP H XVHUBODWWQDP H DJH
                LP DJHBXUO FUHDWHGBDWXSGDWHGBDW

) XQFWLRQDO HSHQGHQFLHV
        XVHUBLG ! XVHUBQDPH XVHUBWSH XVHUBHP DLO XVHUBSDVZRUG
        XVHUBILLWWQDP H XVHUBODWWQDP H DJH LP DJHBXUO FUHDWHGBDWXSGDWHGBDW

&DQGLGDWH. H\ V

^^XVHUBLG``

1 RUP DO) RUP
%&1)

7DEOH' HILQLWLRQ
&5( $7( 7$%/( XVHU
```

```
XVHUBLG                 ,17(*(5  127 18// $872B,1&5(0(17
XVHUBQDPH               9$5&+$5    127 18// 81,48(
XVHUBHPDLO              9$5&+$5    127 18// 81,48(
XVHUBSDVZRUG            9$5&+$5    127 18// 81,48(
XVHUBWSH                9$5&+$5    127 18// &+(&.
 XVHUBWSH ,1 µ$GPLQ¶1RUPDO¶)
XVHUBILUVWQDPH          9$5&+$5
XVHUBODVWQDPH           9$5&+$5
DJH                     ,17(*(5
LPDJHBXUO              9$5&+$5
FUHDWHGBDW              7,0(67$03
XSGDWHGBDW              7,0(67$03
35,0$5<.(<XVHUBLG
```

## )UHQGVKLS

```
5HODWLRQDOO RGHO

)UHQGVKLS ILUVWBXVHUBLG VHFRQGBXVHUBLG IUHQGVKLSBVWDWXV

)XQFWLRQDO HSHQGHQFLHV
1RGHSHQGHQF\

&DQGLGDWH. H\V

^^ILUVWBXVHUBLG VHFRQGBXVHUBLG``

1RUPDO)RUP
%&1)

7DEOH' HILQLWLRQ
&5($7( 7$%/( IUHQGVKLS
      ILUVWBXVHUBLG          ,17(*(5  127 18//
      VHFRQGBXVHUBLG        ,17(*(5  127 18//
      IUHQGVKLSBVWDWXV       675,1*   127 18// &+(&.
       IUHQGVKLSBVWDWXV,1 µ3(1',1* µ$33529('¶µ5(-(&7('¶
      )25(,*1.(<ILUVWBXVHUBLG UHIHUHQFHV86(5 XVHUBLG
      21'(/(7( &$6&$'(
      )25(,*1.(<VHFRQGBXVHUBLG UHIHUHQFHV86(5 XVHUBLG
      21'(/(7( &$6&$'(
      35,0$5<.(<ILUVWBXVHUBLG VHFRQGBXVHUBLG
```

## 6 XEVFUEH

5 HODWRQDO0 RGHO

6 XEVFUEH VKRZ BLG XVHUBLG

) XQFWRQDO HSHQGHQFLHV
1 R GHSHQGHQF\

& DQGLGDWH . H\ V

^^VKRZ BLG XVHUBLG``

1 RUP DO) RUP
%&1 )

7 DEOH ' HILQLWRQ
&5 ( $7( 7$%/ ( VXEVFUEH
VKRZ BLG ,17( * ( 5 12718//
XVHUBLG ,17( * ( 5 12718//
IUHQGVKLSBVWDWXV ,17( * ( 5 12718//
) 25 ( ,* 1 . ( < VKRZ BLG UHIHUHQFHV 6+2 : VKRZ BLG
21 ' ( / ( 7( &$6&$' (
) 25 ( ,* 1 . ( < XVHUBLG UHIHUHQFHV 86 ( 5 XVHUBLG
21 ' ( / ( 7( &$6&$' (
35 ,0 $5 < . ( < XVHUBLG VKRZ BLG

## 1 RWLFDWRQ

5 HODWRQDO0 RGHO

1 RWLFDWRQ QRWLFDWRQBLG 86 ( 5 B,' VWDWXV FUHDWHGBDWVHHQBDWWH[ WOQN

) XQFWRQDO HSHQGHQFLHV

& DQGLGDWH . H\ V

^^QRWLFDWRQBLG``

1 RUP DO) RUP
%&1 )

7DEOH' HILQLWRQ

&5($7( 7$%/( QRWLFDWRQ

QRWLFDWRQBLG ,17(*(5 127 18// $872B,1&5(0(17

XVHUBLG ,17(*(5 127 18//

VWDWXV ,17(*(5

FUHDWHGBDW 7,0(67$03

VHHQBDW 7,0(67$03

WH[W 9$5&+$5

OQN 9$5&+$5

)25(,*1.(< XVHUBLG UHIHUHQFHV86(5 XVHUBLG

21'(/(7( &$6&$'(

35,0$5<.(< QRWLFDWRQBLG

# )XQFWRQDO HSHQGHQFLHV DQG 1 RUP DOL DWRQ RI 7DEOHV

)XQFWRQDOGHSHQGHQFLHV DQG QRUP DOIRUP V DUH GHILQHG LQ 5 HODWRQ 6 FKHP DV SDUWRI WKLV UHSRUW$ OOUHODWRQV DUH FKHFNHG Z KHWKHUWKH\ DUH LQ %R\ FH &RGG QRUP DOIRUP ,WLV FRQFOXGHG WKDWGHFRP SRVLWRQ LV QRWQHFHVVDU\

# ) XQFWLRQDO&RP SRQHQWV

## 8VH&DVHV 6FHQDULRV

* XHUV

- * XHUVFDQ0DQ79 VHULHV DQG P RYLHV ZLWK EDVLF ILOWHUV VXFK DV JHQUH 7UDFN%\ UDWLQJ SRSXODULW\ HWF
- * XHUVFDQ UHYLHZ FDVWLP DJHV DQG WDDLORUV RI VW VHULHV DQG P RYLHV WKURXJK WKHLU VKRZ FDVH SDJHV
- * XHUVFDQ P DNH VHDUFK VSHFLLF 79 6HULHV DQG P RYLHV
- * XHUVFDQ VHH XSFRP LQJ HSLVRGHV RI 79 6HULHV DQG P RYLHV WKURXJK WKH &DOHQGDU

8VHU

- 8VHUFDQ RJLQ WR V\VWHP ZLWK HP DLODQG SDVVZRUG
- 8VHUFDQ P DUN HSLVRGHV DV Z DWFKHG
- 8VHUFDQ VXEVFULEH WR VHFLLF 79 6HULHV
- 8VHUFDQ JHQRWLFHG ZKHQ WKH QHZ HSLVRGH RI VXEVFULEHG VW VHULHV DULYHV
- 8VHUFDQ P DNH VHDUFK VHFLLF 79 6HULHV DQG P RYLHV
- 8VHUFDQ FRP P HQWRQ 79 VHULHV VHFLLF HSLVRGHV VHDVRQV DQG P RYLHV
- 8VHUFDQ FRP P HQWRQ RWKHUXVHUV¶DFWRQV WKHLUFRP P HQWV HW
- 8VHUFDQ UDWH 79 VHULHV VHFLLF HSLVRGHV VHDVRQV DQG P RYLHV
- 8VHUFDQ GURS UHDFWRQ HP RWRWR RWKHUXVHUV¶DFWRQV
- 8VHUFDQ VHQG IULHQGVKLS UHTXHVWV WR RWKHUXVHUV
- 8VHUFDQ DFFHSWRULJQRUH IULHQGVKLS UHTXHVWV
- 8VHUFDQ0DQ79 VHULHV DQG P RYLHV ZLWK DGYDQFHG ILOWHUV VXFK DV ,0 ' %UDWQJ GHQJWK ODQJXDJH RUJLQFRXQWU RI WKH P RYLH
- 8VHUFDQ UHYLHZ FDVWLP DJHV DQG WDDLORUV RI VW VHULHV DQG P RYLHV WKURXJK WKHLU VKRZ FDVH SDJHV
- 8VHUFDQ FKHFN RXWWKH XSFRP LQJ VW VHULHV¶HSLVRGHV E\ WDNH D &RRN DV7&DOHQGDU
- 8VHUFDQ DYRLG VSRLOHUV E\ FRQLJXULQJ WKH SHUVRQDOLHWQJV
- 8VHUFDQ JHWHP DLOQRWLFDWRQV IRUWKHLUDFWRQV DQG VXEVFULSWRQV
- 8VHUFDQ WDDUWGLVFXVVLRQ DERXW79 VHULHV DQG P RYLHV

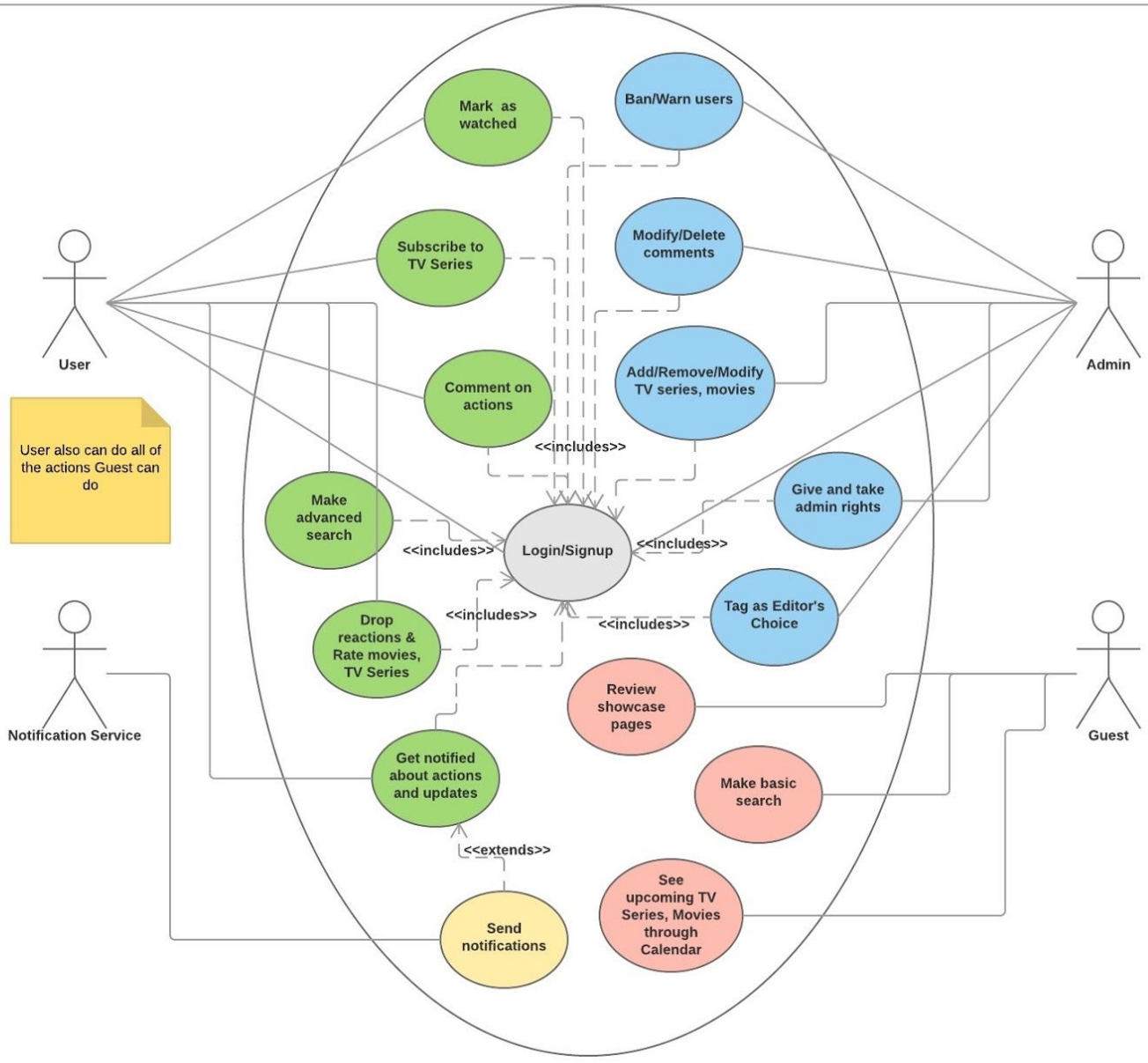
$GP LQ

- $GP LQFDQ &RJLQ WR V\VWHP ZLWK HP DLODQG SDVVZRUG
- $GP LQFDQ EDQ XVHUV IURP WKH SODWRUP

- $GPLQFDQZDWQXVHUVEHFDXVHRIWKHLUIDJJHGDFWLRQV
- $GPLQFDQGHOHWHFRPPHQWV
- $GPLQFDQPRGLI\\FRPPHQWVDFFRUGLQJWRFRPPXQLW\UXOHV
- $GPLQFDQWXU79VHULHVPRYLHVDV(GLWRU¶V&KRLFH
- $GPLQFDQDGGVSHFLILFPRYLHV79VHULHV
- $GPLQFDQPRGLI\\WKHLQIRUPDWLRQUHODWHGWRPRYLHVDQG79VHULHV
- $GPLQFDQGHOHWHWKHRFFXUUHQFHRIVSHFLILFPRYLHVDQG79VHULHV
- $GPLQFDQJLYHDQGWDNHVRPHRIWKHDGPLQLVWUDWLYHULJKWVWRRWKHUXVHUV

## TRACKBY.ME USE CASE DIAGRAM

November 20, 2017



## $ OJ RULWKP V

+ RZ GR Z H FDOFXODWH VWDUUDWLQJ " : H FRXOG IXVWWDNH WKH Z HLJ KWHG DYHUDJ H« EXWLWLV ERULQJ «

& RQVWDLQW

+ DYH XVHUDFWXDOO P DUNHG WKDWP RYLH DV Z DWFKHG EHIRUH UDWH LW
+ RZ P DQ\ ³EDG´ DQG³JRRG´ UHDFWRQV KH JRWRQ KLV UDWH DFWRQ"
$ UH RWKHUXVHUV DFWXDOO GLVONLQJ RUONLQJ KLV UDWH WR P RYLH" ' R WKH\ ILQG LWKHOSIXORU QRW
+ RZ ROG LV WKH DFFRXQW VLQFH LW FUHDWRQ GDWH
+ RZ DFWLYH LV WKH XVHU' FKHFN WKH WRWDOFRP P HQW Z DWFKHG P RYLHV HWF
,V KH IXVWWSDP P LQJ Z LWK VWDUUDWLQJ V" 2 ULV KH D ERWWKDWJ LYHV VWDUWR OWHUDOO HYHU\ WKLQJ"
+ RZ P DQ\ IROORZ HUV IUHQGV KH JRW ,I KH LV LQIOXHQWDOSHUVRQ Z H P XOWSO KLV UDWLQJ Z LWK VRP H SUHGHILQHG IDFWRU

$ IWHUFRUUHFWO FDOFXODWLQJ DQG FRP SXWLQJ WKH RYHUDOOUDWLQJ RI WKH VSHFLILF P RYLH HSLVRGH VHDVRQ RU79 6 HULHV DV D Z KROH Z H VLP XOWDQHRXVO FKDQJH WKH UDWLQJ BYDOXH RI LW

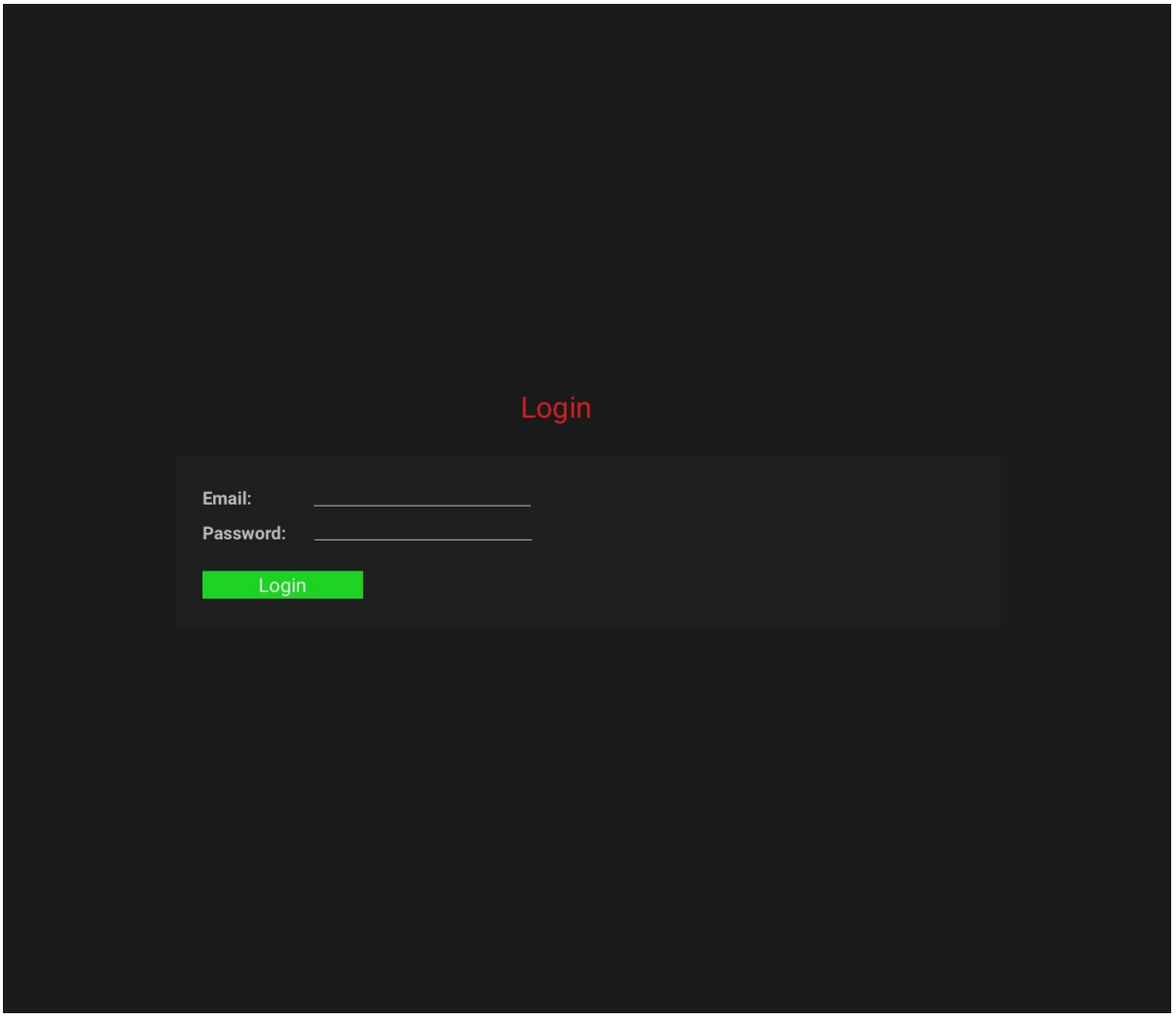
## ' DWD 6 WUXFWXUHV ' DWD 7\ SHV

: H Z LOOXVH EXLOWLQ GDWD WSHV RI 0 \ 64 / VXFK DV

" 7( ; 7
" ' $7(
" 9$5&+$5
" ,17( * ( 5
" 7,0 ( 67$0 3
" ' 28%/ (

# 8VHU,QWHUIDFH'HVLJQDQG&RUUHVSRQGLQJ64/6WDWHPHQWV

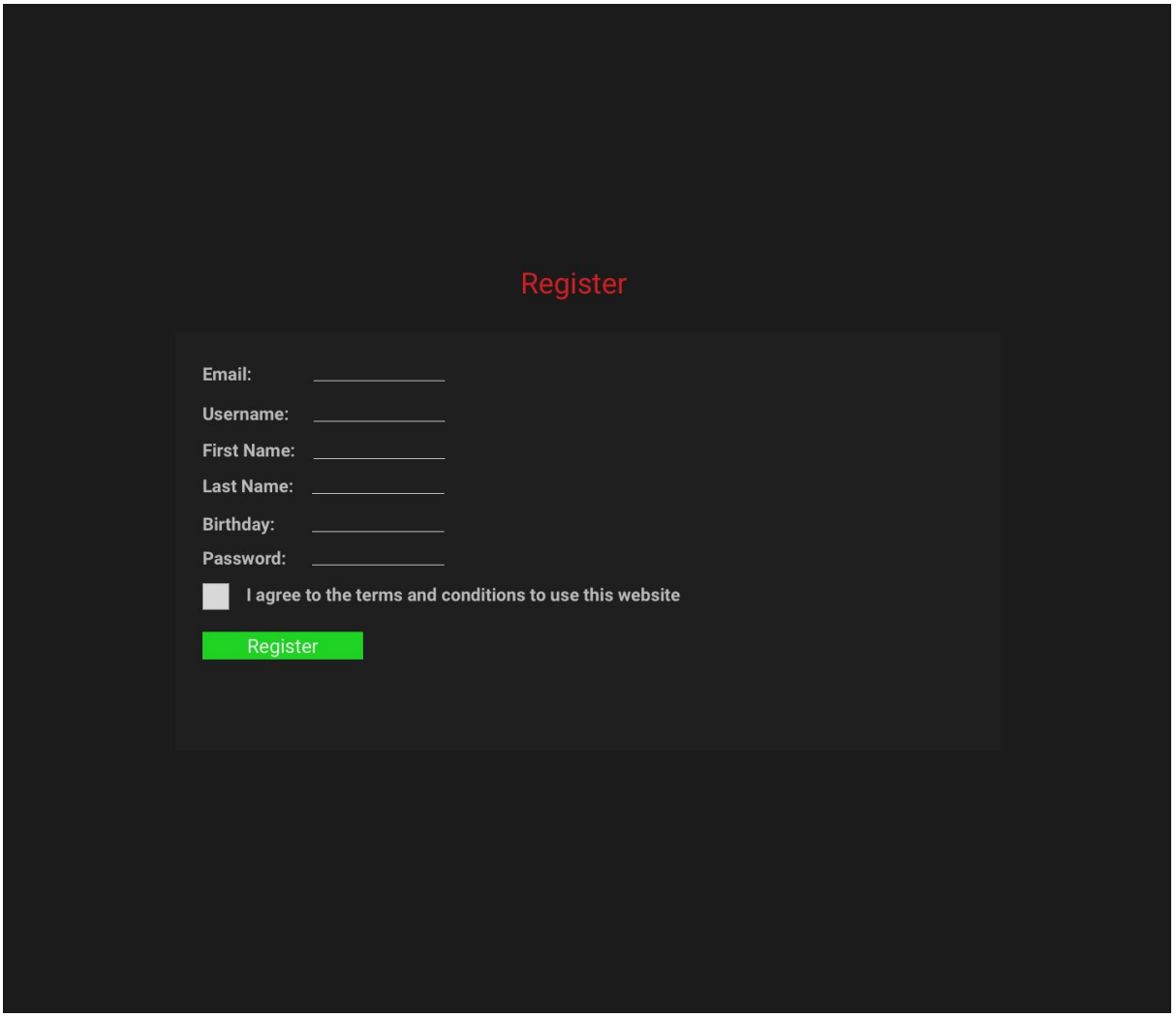
## /RJLQ




,QSXW #HP DLO# SDVVZRUG
3URFHVV 8VHUHQWHUV KHUHP DLODQG SDVVZRUG WR HQWHUWKH V\VWHP

64/ 6WDWHPHQWV
/RJLQ
6(/(&7 HP DLO SDVVZRUG
)520 XVHUV
: +(5( HP DLO# HP DLO$1' SDVVZRUG # SDVVZRUG

5 HJ LVWMU



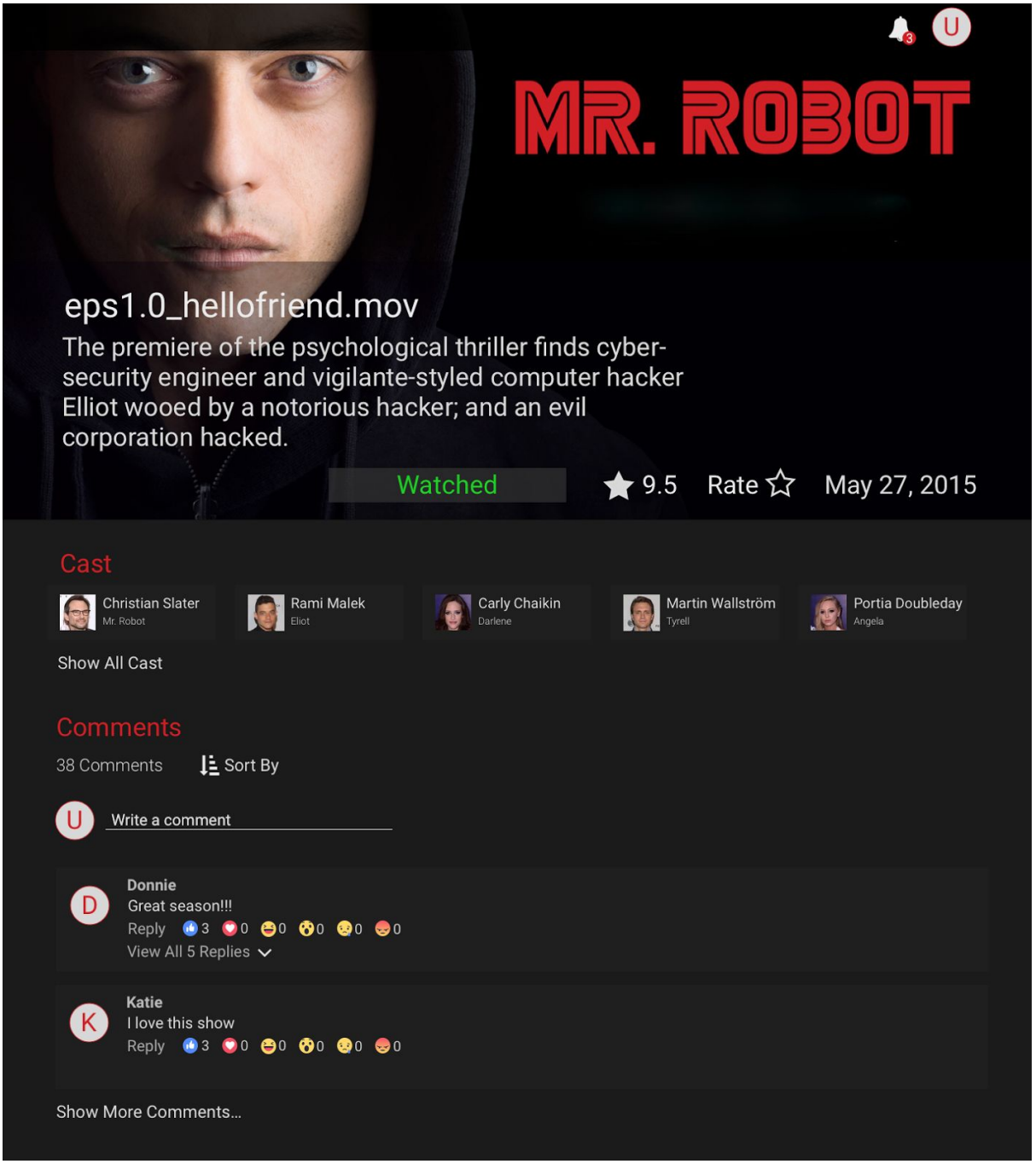

,QSXW # HP DLO# SDVVZ RUG # XVHUQDP H # ILLWQDP H # ODVWQDP H # ELLWKGDWM
3 URFHVV 8 VHUVSHFLL\ KHUHP DLO VHOHFWMG SDVVZ RUG VHOHFWMG XVHUQDP H KHUILLWQDP H
ODVWQDP H DQG ELLWKGDWM VR UHJ LVWMUWKH V\ VWMP $ OVR XVHUVKRXOG DFFHSWXVHUDJ UHHP HQWLQ
RUGHUVR UHJ LVWMUWKH V\ VWMP

6 4 / 6 VDWMP HQW

&KHFN LL HP DLODQG XVHUQDP H H[ LVW
6 ( / ( &7 HP DLO XVHUQDP H ) 5 2 0 XVHU: + ( 5 ( HP DLO # HP DLO2 5
XVHUQDP H # XVHUQDP H

6 DYH 8 VHU7 R ' DWDEDVH KDVKHG SDVVZ RUG Z LOOEH SXWLQWR GE
,1 6 ( 5 7 ,1 7 2 XVHU HP DLO XVHUQDP H ILLWQDP H ODVWQDP H SDVVZ RUG ELLWKGDWM
9 $ / 8 ( 6 # HP DLO# XVHUQDP H # ILLWQDP H # ODVWQDP H # SDVVZ RUG # ELLWKGDH

( SLVRGH




,QSXW # HSLVRGHBLG # VHDVRQBLG # XVHUBLG # UDWLQJ

3 URFHVV 7KH HSLVRGH VFUHHQ KDV IRXU DLQ IHDWXUHV ) LWWO ZKHQ WKH HSLVRGH VFUHHQ LV RSHQHG LWGLVSOD\ V VXP P DU RI HSLVRGH ZLWK QDP H RI WKH HSLVRGH $OVR XVHUFDQ VHH GDWH RI UHOHDVH RI WKH HSLVRGH 6HFRQGO XVHUFDQ VHH ZKHWKHUWKH ZDWFKHG RUQNHG HSLVRGH 8 VHUFDQ P DUN DV ZDWFKHG LI VKH ZDWFK WKLV HSLVRGH 7KLUGO XVHUFDQ UHP DUN ZKHWKHUWKH QNHG HSLVRGH RUQRWE\ SUHVLQJ HP RWLEXWRQV ) RXUWKO XVHUFDQ VHH FDWDDQG FUHZ FUHGLW RI WKH HSLVRGH ) RXUWKO XVHUFDQ Z UDWH DQG HGLWFRP P HQW RQ HSLVRGH %HMLGHV XVHUFDQ VHH UHSO DQG QNH FRP P HQW E\ RWKHUXVHUV $OVR FRP P HQW FDQ EH ILOWHUHG E\ FRXQWRI UHSO RUQNH

```
64/ 6WDWHPHQWV

)HWFK(SLVRGH,QIR
6(/(&7 )52 HSLVRGH: +(5( HSLVRGHBLG  # HSLVRGHBLG

)HWFK&RPPHQWV
6(/(&7 FRPPHQW)52 FRPPHQW
      ,11(5-2,1 HSLVRGHBFRPPHQW21 HSLVRGHBFRPPHQW=HSLVRGHBLG  # HSLVRGHBLG
      ,11(5-2,1 SXEOLFBXVHU21 FRPPHQWXVHUBLG  SXEOLFBXVHUXVHUBLG

)HWFK&RPPHQW5HDFWLRQV
6(/(&7 UHDFWLRQ  FRPPHQWBUHDFWLRQFRPPHQWBLG)52 UHDFWLRQ
      ,11(5-2,1 FRPPHQWBUHDFWLRQ
            21 FRPPHQWBUHDFWLRQFRPPHQWBLG
                  ,1 6(/(&7 FRPPHQWBLG)52 FRPPHQW
                        ,11(5-2,1 HSLVRGHBFRPPHQW21
                        HSLVRGHBFRPPHQW=HSLVRGHBLG  # HSLVRGHBLG

      *5283%< FRPPHQWBUHDFWLRQFRPPHQWBLG UHDFWLRQUHDFWLRQBWYSH

)HWFK&RPPHQW5HSOLHV
6(/(&7 FRPPHQW)52 FRPPHQW
      ,11(5-2,1 SXEOLFBXVHU21 FRPPHQWXVHUBLG  SXEOLFBXVHUXVHUBLG
      :+(5( SDUHQWBLG,1
        6(/(&7 FRPPHQWBLG)52 FRPPHQW
            ,11(5-2,1 HSLVRGHBFRPPHQW21 HSLVRGHBFRPPHQW=HSLVRGHBLG
            # HSLVRGHBLG

      *5283%< SDUHQWBLG

&UHDWH1HZ &RPPHQW
# XXLG  8QLTXHIGJHQHUDWHGE\ EDFNHQGFRGH
,16(57,172 FRPPHQWFRPPHQWBLG ERG\ XVHUBLG 9$/8(6 # XXLG # ERG\ # XVHUBLG
,16(57,172 HSLVRGHBFRPPHQWFRPPHQWBLG HSLVRGHBLG 9$/8(6 # XXLG # HSLVRGHBLG

)HWFK,V:DWFKHG
6(/(&7 &2817 )52 ZDWFK
      ,11(5-2,1 HSLVRGHBZDWFK21
            HSLVRGHBZDWFK HSLVRGHBLG  # HSLVRGHBLG$1'
      :+(5(
            ZDWFK XVHUBLG  # XVHUBLG


)HWFK,V5DWHG
6(/(&7 UDWLQJ)52 UDWH
      ,11(5-2,1 HSLVRGHBUDWH21
            HSLVRGHBUDWH HSLVRGHBLG  # HSLVRGHBLG$1'
            UDWH XVHUBLG  # XVHUBLG
```

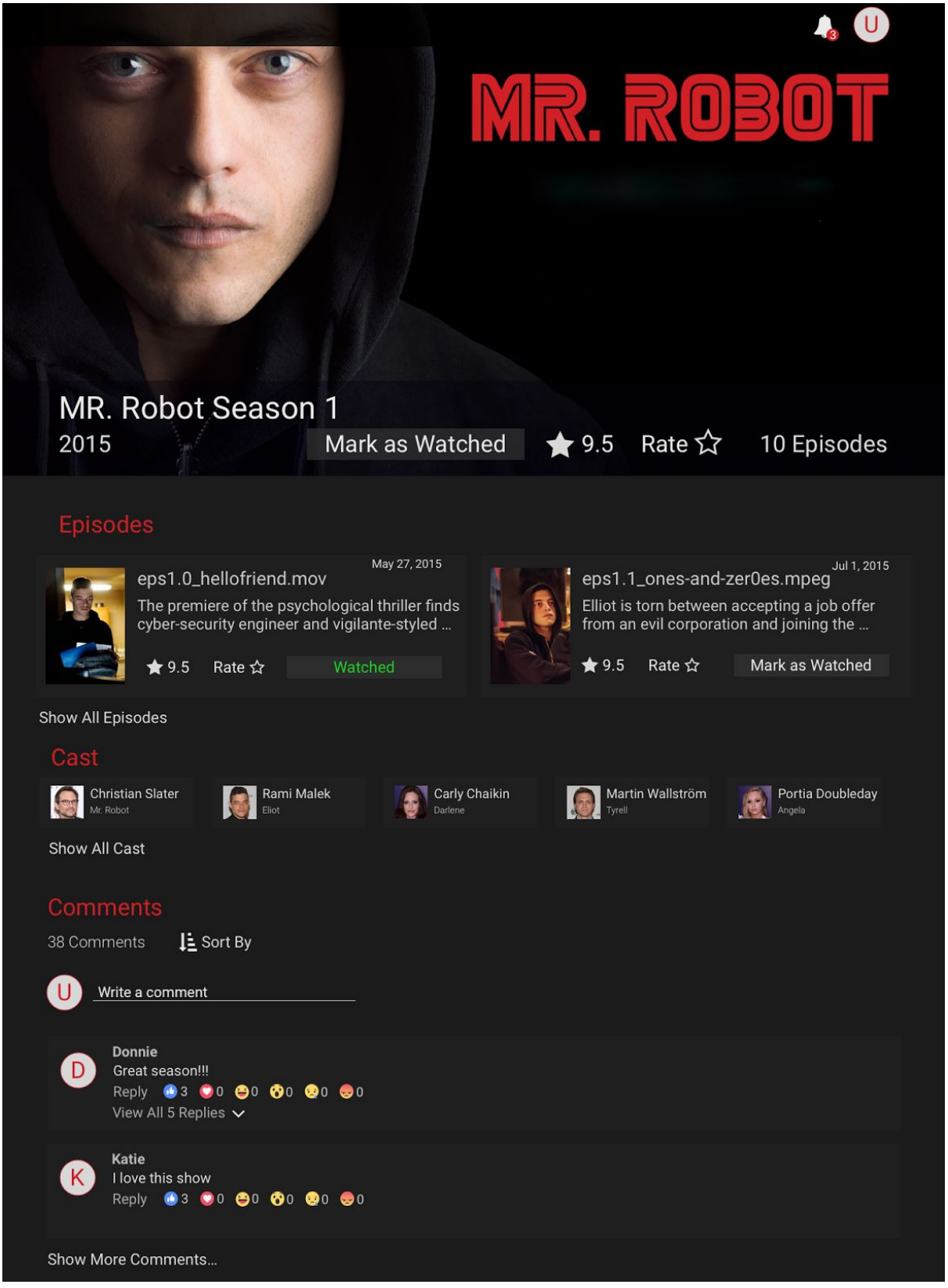
```
&DVW
6(/(&7 FDVW)52 DFW
      ,11(5-2,1 HSLVRGHBDFW21 DFWDFWBLG HSLVRGHBDFWDFWBLG
      ,11(5-2,1 FDVWFDVWBLG DFWFDVWBLG


5DWH(SLVRGH ,I ,WLVQ¶WUDWHG EHIRUH
# XXLG 8QLTXHLGJHQHUDWHG E\ EDFNHQG VFULSW

,16(57,172 UDWQJ UDWQJBLG XVHUBLG UDWQJ 9$/8(6 # XXLG # XVHUBLG # UDWQJ
,16(57,172 HSLVRGHBUDWQJ UDWQJBLG HSLVRGHBLG 9$/8(6 # XXLG# HSLVRGHBLG

5DWH(SLVRGH ,I ,WLV DOHDG\ UDWHG
83'$7( UDWQJ 6(7 UDWQJ # UDWQJ
      :+(5( UDWQJBLG,1
            6(/(&7 UDWQJBLG)52 HSLVRGHBUDWH: +(5( HSLVRGHBLG # HSLVRGHBLG
      $1' XVHUBLG # XVHUBLG
```

6HDVRQ




,QSXW #VHDVRQBLG #VKRZBLG #XVHUBLG #FRP P HQWBERG\
3URFHVV 7KH VHDVRQ VFUHHQ KDV IRXUP DLQ IHDWXUHV ) LWWD ZKHQ WKH VHDVRQ VFUHHQ LV RSHQHG LWGLVSOD\V DOORI WKH HSLVRGHV LQ VHDFWLRQ DQG WKHLUGHWDLOV $OVR XVHUFDQ VHH ZKHWKHUVKH ZDWFKHG RUQHG VHDVRQ 8VHUFDQ P DUN DV ZDWFKHG LL VKH ZDWFK WKLV

```
VHDVRQ 6HFRQGDU XVHUFDQUHP DUNZKHWKHUVKHOGNHG VHDVRQ RUQRWE\ SUHVVLQJ GNH
EXWWRQV 7KLUGG XVHUFDQ VHH FDWDDQG FUHZ FUHGLWV RI WKH VHDVRQ ) RXUWKG XVHUFDQ ZULWH
DQG HGLWFRPP HQWV RQ VHDVRQ %HMLGHV XVHUFDQ VHH UHSO DQGGNH FRP P HQWV E\ RWKHU
XVHUV $GYR FRP P HQWV FDQ EH ILOWHUHG E\ FRXQWRI UHSO RUGNH

64/ 6WDWHP HQWV

) HWFK 6HDVRQ ,QIR
6(/(&7 )52 0 VHDVRQ: +(5( VHDVRQBLG # VHDVRQBLG

) HWFK &RP P HQWV
6(/(&7 FRP P HQWV )52 0 FRP P HQWV
      ,1 1(5 -2,1 VHDVRQBFRP P HQW21 VHDVRQBFRP P HQWVHDVRQBLG # VHDVRQBLG
      ,1 1(5 -2,1 SXEOFBXVHU21 FRP P HQWKVHUBLG SXEOFBXVHUXVHUBLG

) HWFK &RP P HQW5HDFWLRQV
6(/(&7 UHDFWLRQ FRP P HQWBUHDFWLRQ FRP P HQWBLG)52 0 UHDFWLRQ
      ,1 1(5 -2,1 FRP P HQWBUHDFWLRQ
            21 FRP P HQWBUHDFWLRQ FRP P HQWBLG
                  ,1 6(/(&7 FRP P HQWBLG)52 0 FRP P HQWV
                        ,1 1(5 -2,1 VHDVRQBFRP P HQW21
                        VHDVRQBFRP P HQWVHDVRQBLG # VHDVRQBLG

      * 5283 %< FRP P HQWBUHDFWLRQ FRP P HQWBLG UHDFWLRQ UHDFWLRQBWSH

) HWFK &RP P HQW5HSOLHV
6(/(&7 FRP P HQWV )52 0 FRP P HQWV
      ,1 1(5 -2,1 SXEOFBXVHU21 FRP P HQWKVHUBLG SXEOFBXVHUXVHUBLG
       : +(5( SDUHQWBLG,1
        6(/(&7 FRP P HQWBLG)52 0 FRP P HQWV
            ,1 1(5 -2,1 VHDVRQBFRP P HQW21 VHDVRQBFRP P HQWVHDVRQBLG
            # VHDVRQBLG

      * 5283 %< SDUHQWBLG

&UHDWH1HZ &RP P HQWV
# XXLG 8QLTXHLGJHQHUDWHGE\ EDFNHQGFRGH
,16(57,172 FRP P HQWFRP P HQWBLG ERG\ XVHUBLG 9$/8(6 # XXLG # ERG\ # XVHUBLG
,16(57,172 VHDVRQBFRP P HQWFRP P HQWBLG VHDVRQBLG 9$/8(6 # XXLG # VHDVRQBLG

) HWFK,V: DWFKHG
6(/(&7 &2817 )52 ZDWFK
      ,1 1(5 -2,1 VHDVRQBZDWFK21
            VHDVRQBZDWFK VHDVRQBLG # VHDVRQBLG
      : +(5( ZDWFK XVHUBLG # XVHUBLG
```

```
) HMFK ,V 5 DMG
6( / ( &7 UDMQJ ) 5 2 0 UDM
      ,11 ( 5 - 2 ,1 VHDVRQBUDM 2 1
            VHDVRQBUDM VHDVRQBLG  # VHDVRQBLG $1'
            UDM XVHUBLG  # XVHUBLG

&DVW
6( / ( &7 FDVW ) 5 2 0 DFW
      ,11 ( 5 - 2 ,1 VHDVRQBDFW 2 1 DFWDFWBLG  VHDVRQBDFWDFWBLG
      ,11 ( 5 - 2 ,1 FDVW 2 1 FDVWFDVWBLG  DFWFDVWBLG



5 DM 6 HDVRQ ,I ,WLVQ¶WUDMG EHIRUH
# XXLG  8QLTXHLGJHQHUDMG E\ EDFNHQG VFULSW

,16 ( 57 ,172 UDMQJ UDMQJBLG XVHUBLG UDMQJ 9$/8 ( 6  # XXLG # XVHUBLG # UDMQJ
,16 ( 57 ,172 VHDVRQBUDMQJ UDMQJBLG VHDVRQBLG 9$/8 ( 6 # XXLG# VHDVRQBLG

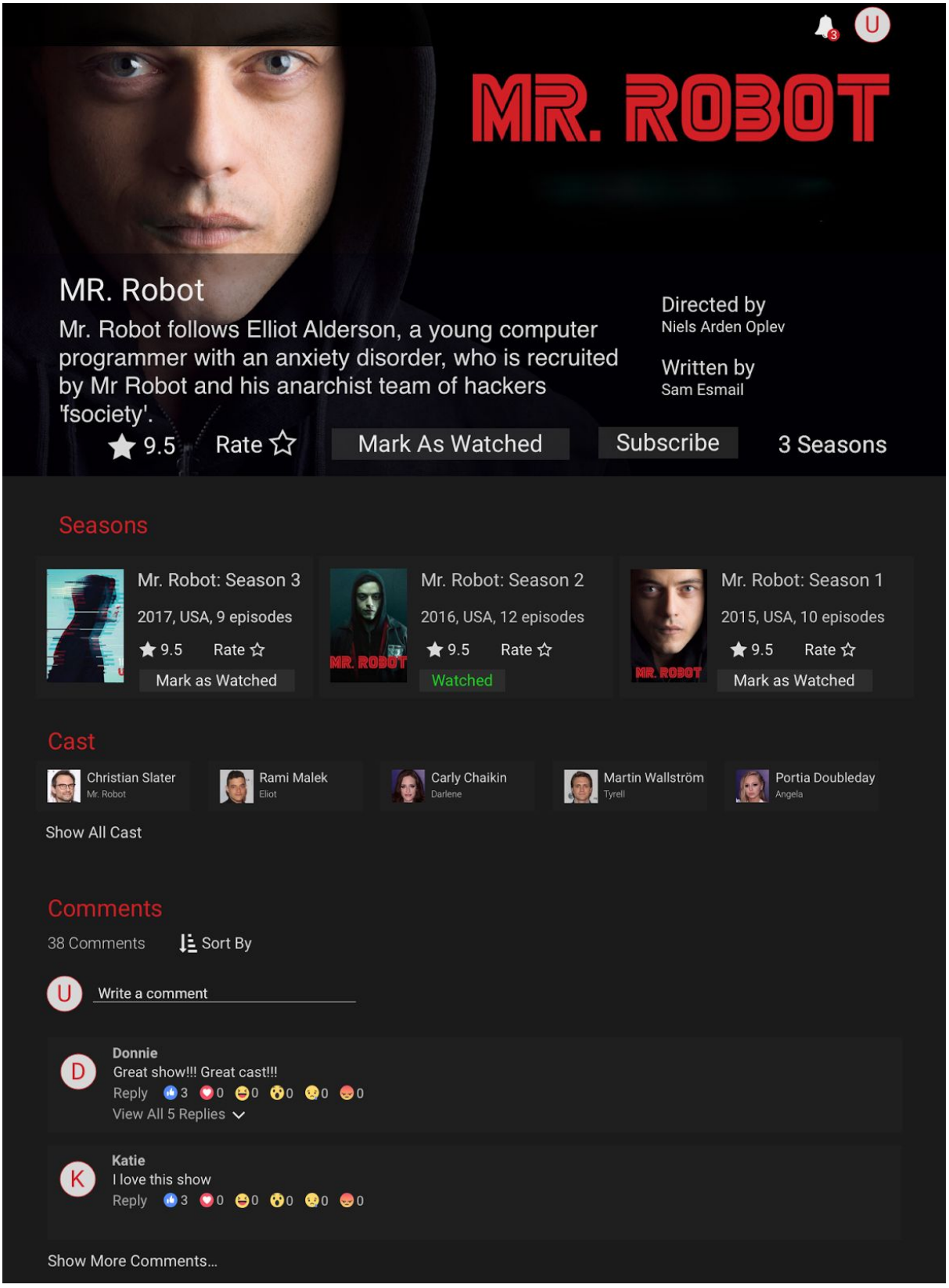
5 DM 6 HDVRQ ,I ,WLV DOHDG\ UDMG
83' $7( UDMQJ 6 ( 7 UDMQJ  # UDMQJ
      : + ( 5 ( UDMQJBLG ,1
            6( / ( &7 UDMQJBLG ) 5 2 0 VHDVRQBUDM : + ( 5 ( VHDVRQBLG  # VHDVRQBLG
      $1' XVHUBLG  # XVHUBLG

) HMFK ( SLVRGHV
6( / ( &7  ) 5 2 0 HSLVRGH
      : + ( 5 ( VHDVRQBLG  # VHDVRQBLG

) HMFK ( SLVRGHV ,V 5 DMG
6( / ( &7 UDMQJ ) 5 2 0 UDM
      / ( ) 7 - 2 ,1 HSLVRGHBUDM 2 1
            HSLVRGHBUDM HSLVRGHBLG ,1
                  6( / ( &7  ) 5 2 0 HSLVRGH : + ( 5 ( VHDVRQBLG  # VHDVRQBLG $1'
            UDM XVHUBLG  # XVHUBLG
      * 5 2 8 3 %< HSLVRGHBLG

) HMFK ( SLVRGHV ,V : DMFKHG
6( / ( &7 &2817  ) 5 2 0 ZDMFK
      ,11 ( 5 - 2 ,1 HSLVRGHBZDMFK 2 1
            HSLVRGHBUDM HSLVRGHBLG ,1
                  6( / ( &7  ) 5 2 0 HSLVRGH : + ( 5 ( VHDVRQBLG  # VHDVRQBLG $1'
      : + ( 5 ( ZDMFK XVHUBLG  # XVHUBLG
      * 5 2 8 3 %< HSLVRGHBLG
```

6 KRZ


MR. ROBOT
MR. Robot
Mr. Robot follows Elliot Alderson, a young computer programmer with an anxiety disorder, who is recruited by Mr Robot and his anarchist team of hackers 'fsociety'.
Directed by
Niels Arden Oplev
Written by
Sam Esmail
9.5
Rate
Mark As Watched
Subscribe
3 Seasons
Seasons
Mr. Robot: Season 3
2017, USA, 9 episodes
9.5
Rate
Mark as Watched
Mr. Robot: Season 2
2016, USA, 12 episodes
9.5
Rate
Watched
Mr. Robot: Season 1
2015, USA, 10 episodes
9.5
Rate
Mark as Watched
Cast
Christian Slater
Mr. Robot
Rami Malek
Eliot
Carly Chaikin
Darlene
Martin Wallström
Tyrell
Portia Doubleday
Angela
Show All Cast
Comments
38 Comments
Sort By
Write a comment
Donnie
Great show!!! Great cast!!!
Reply
View All 5 Replies
Katie
I love this show
Reply
Show More Comments...

```
,QSXW # VKRZBLG # XVHUBLG # UDWH # ERG\

3URFHVV 7KH VKRZ VFUHHQ KDV WKUHH P DLQ IHDWXUHV ) LUVW ZKHQ WKH VKRZ VFUHHQ LV
RSHQHG LWGLVSOD\V GHWDLOV RI WKH VKRZ LQFOXGHV FUHGLW QXP EHURI VHDVRQV VXEVFULEH
XVHUUDWQJV DQG SURWXP P DU $OR XVHUFDQ VHH ZKHWKHUVKH ZDWKHG RUQHG VKRZ 8VHU
FDQ P DUN DV ZDWKHG LI VKH ZDWK WKLV VKRZ 6HFRQGO XVHUFDQ GLVSOD\ DOORI WKH HSLVRGHV
RI WKH VKRZ ZLWK WKHLUXVHUUDWQJV 7KLUGO XVHUFDQ ZULWH DQG HGLWFRP P HQWV RQ VKRZ
%HVLGHV XVHUFDQ VHH UHSO DQG OLNH FRP P HQWV E\ RWKHUXVHUV $OR FRP P HQWV FDQ EH
ILOWHUHG E\ FRXQWRI UHSO RUOLNH
```

## 64/ 6WDWMP HQWV

```
) HWFK 6KRZ ,QIR
6(/(&7 )520 VKRZ : +(5( VKRZBLG # VKRZBLG

) HWFK &RP P HQWV
6(/(&7 FRP P HQWV )520 FRP P HQWV
      ,11(5-2,1 SXEOFBXVHU21 FRP P HQWVXVHUBLG SXEOFBXVHUXVHUBLG
      ,11(5-2,1 VKRZBFRP P HQWV21 VKRZBFRP P HQWVKRZBLG # VKRZBLG

) HWFK &RP P HQWV5HDFWLRQV
6(/(&7 UHDFWLRQ FRP P HQWVBUHDFWLRQ FRP P HQWVBLG)520 UHDFWLRQ
      ,11(5-2,1 FRP P HQWVBUHDFWLRQ
            21 FRP P HQWVBUHDFWLRQ FRP P HQWVBLG
                  ,1 6(/(&7 FRP P HQWVBLG)520 FRP P HQWV
                        ,11(5-2,1 VKRZBFRP P HQWV21
                              VKRZBFRP P HQWVKRZBLG # VKRZBLG

      *5283 %< FRP P HQWVBUHDFWLRQ FRP P HQWVBLG UHDFWLRQ UHDFWLRQBWSH

) HWFK &RP P HQWV5HSOLHV
6(/(&7 FRP P HQWV )520 FRP P HQWV
      ,11(5-2,1 SXEOFBXVHU21 FRP P HQWVXVHUBLG SXEOFBXVHUXVHUBLG
      : +(5( SDUHQWBLG,1
        6(/(&7 FRP P HQWVBLG)520 FRP P HQWV
            ,11(5-2,1 VKRZBFRP P HQWV21 VKRZBFRP P HQWVWHDVRQBLG # VKRZBLG

      *5283 %< SDUHQWBLG

&UHDWH1HZ &RP P HQWV
# XXLG 8QLTXHLGJHQHUDWHGE\ EDFNHQG FRGH
,16(57,172 FRP P HQWVFRP P HQWBLG ERG\ XVHUBLG 9$/8(6 # XXLG # ERG\ # XVHUBLG
,16(57,172 VKRZBFRP P HQWVFRP P HQWBLG VKRZBLG 9$/8(6 # XXLG # VKRZBLG
```

```
) HMFK ,V :  DMFKHG
6( / / ( &7 &2 8 1 7   ) 5 2 0  Z DMFK
      ,1 1 ( 5 - 2 ,1  VKRZ BZ DMFK 2 1
            VKRZ BZ DMFK VKRZ BLG   # VKRZ BLG
      : +( 5 (  Z DMFK XVHUBLG   # XVHUBLG

) HMFK ,V 5 DMMG
6( / / ( &7 UDMQJ ) 5 2 0  UDMM
      ,1 1 ( 5 - 2 ,1  VKRZ BUDMM 2 1
            VKRZ BUDMM VKRZ BLG   # VHDVRQBLG $1'
            UDMM XVHUBLG   # XVHUBLG

& DVW
6( / / ( &7 FDVW ) 5 2 0  DFW
      ,1 1 ( 5 - 2 ,1  VKRZ BDFW2 1  DFWDFWBLG   VKRZ BDFWDFWBLG
      ,1 1 ( 5 - 2 ,1  FDVW2 1  FDVWFDVWBLG   DFWFDVWBLG


5 DMM 6 KRZ  ,I ,WLV QTWUDMMG EHIRUH
# XXLG  8 QLTXH LG JHQHUDMMG E\  EDFNHQG VFULSW

,1 6( 5 7 ,1 72  UDMQJ UDMQJ BLG  XVHUBLG  UDMQJ  9$/ 8 ( 6  # XXLG # XVHUBLG # UDMQJ
,1 6( 5 7 ,1 72  VKRZ BUDMQJ UDMQJ BLG  VKRZ BLG  9$/ 8 ( 6  # XXLG# VKRZ BLG

) HMFK ,V 6 XEVFULEHG
6( / / ( &7   ) 5 2 0  VXEVFULEH :  +( 5 (  XVHUBLG # XVHUBLG $1'  VKRZ BLG   # VKRZ BLG

6 XEVFULEH
,1 6( 5 7 ,1 72  VXEVFULEH XVHUBLG  VKRZ BLG  9$/ 8 ( 6  # XVHUBLG # VKRZ BLG

8 QVXEVFULEH
' ( / / ( 7 (  ) 5 2 0  VXEVFULEH :  +( 5 (  XVHUBLG # XVHUBLG $1'  VKRZ BLG   # VKRZ BLG

5 DMM 6 KRZ  ,I ,WLV DQHDG\  UDMMG
83' $7 (  UDMQJ 6 ( 7 UDMQJ  # UDMQJ
      : +( 5 (  UDMQJ BLG ,1
            6( / / ( &7 UDMQJ BLG ) 5 2 0  VKRZ BUDMM :  +( 5 (  VKRZ BLG   # VKRZ BLG $1'
      XVHUBLG   # XVHUBLG

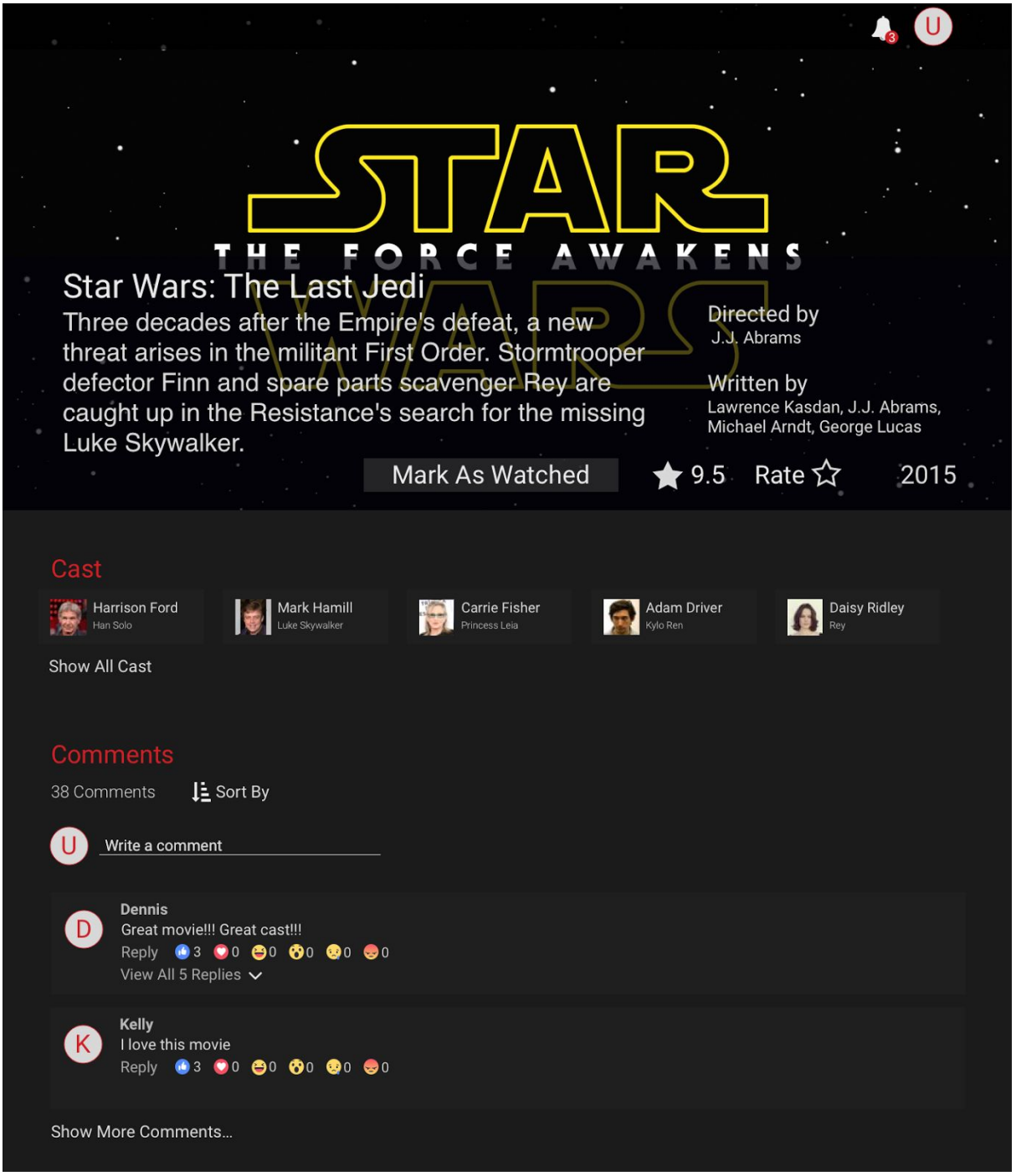
) HMFK 6 HDVRQV
6( / / ( &7   ) 5 2 0  VHDVRQ
      : +( 5 (  VKRZ BLG   # VKRZ BLG

) HMFK 6 HDVRQ ,V 5 DMMG
6( / / ( &7 UDMQJ ) 5 2 0  UDMM
      / ( ) 7 - 2 ,1  VHDVRQBUDMM 2 1
            VHDVRQBUDMM HSLVRGHBLG ,1
```

```
                6(/(&7  )52 VHDVRQ: +(5( VKRZBLG  # VKRZBLG $1'
          UDWXVHUBLG  # XVHUBLG
     *5283 %< VHDVRQBLG

)HWFK6HDVRQ,V: DWKHG
6(/(&7&2817  )52 ZDWK
     ,11(5-2,1 VHDVRQBZDWK21
          VHDVRQBUDWHSLVRGHBLG,1
                6(/(&7  )52 VHDVRQ: +(5( VKRZBLG  # VKRZBLG $1'
     : +(5( ZDWKXVHUBLG  # XVHUBLG
     *5283 %< HSLVRGHBLG
```

0 RYLH




,QSXW # P RYLHBLG # XVHUBLG # ERG\ # UDWH
3 URFHVV 7 KH P RYLH VFUHHQ KDV WZR P DLQ IHDWXUHV ) LUWO Z KHQ WKH P RYLH VFUHHQ LV
RSHQHG LWGLVSOD\ V GHWDLOV RI WKH P RYLH LQFOXGHV FUHZ FUHGLW XVHUUDWLQJ V GDWH RI UHOHDVH
DQG SORWXP P DU\ $ OVR XVHUFDQ VHH Z KHWKHUVKH Z DWFKHG RUUDWHG P RYLH 8 VHUFDQ P DUN
DV Z DWFKHG LL VKH Z DWFK WKLV P RYLH 6 HFRQGO XVHUFDQ Z UWH DQG HGLWFRP P HQW RQ P RYLH
%HVLGHV XVHUFDQ VHH UHSO DQG ONH FRP P HQW E\ RWKHUXVHUV $ OVR FRP P HQW FDQ EH
ILOWHUHG E\ FRXQWRI UHSO RUONH

```
64/ 6WDWHPHQWV

)HWFK6KRZ ,QIR
6(/(&7 )52 PRYLH: +(5( PRYLHBLG # PRYLHBLG

)HWFK&RPPHQWV
6(/(&7FRPPHQW)52 FRPPHQW
      ,11(5-2,1 SXEOLFBXVHU21 FRPPHQWKVHUBLG SXEOLFBXVHUXVHUBLG
      ,11(5-2,1 PRYLHBFRPPHQW21 PRYLHBFRPPHQWWKRZBLG # PRYLHBLG

)HWFK&RPPHQW5HDFWLRQV
6(/(&7UHDFWLRQ FRPPHQWBUHDFWLRQFRPPHQWBLG)52 UHDFWLRQ
      ,11(5-2,1 FRPPHQWBUHDFWLRQ
            21 FRPPHQWBUHDFWLRQFRPPHQWBLG
                  ,1 6(/(&7FRPPHQWBLG)52 FRPPHQW
                        ,11(5-2,1 PRYLHBFRPPHQW21
                              PRYLHBFRPPHQWWKRZBLG # PRYLHBLG

      *5283%< FRPPHQWBUHDFWLRQFRPPHQWBLG UHDFWLRQUHDFWLRQBWYSH

)HWFK&RPPHQW5HSOLHV
6(/(&7FRPPHQW)52 FRPPHQW
      ,11(5-2,1 SXEOLFBXVHU21 FRPPHQWKVHUBLG SXEOLFBXVHUXVHUBLG
      :+(5( SDUHQWBLG,1
        6(/(&7FRPPHQWBLG)52 FRPPHQW
            ,11(5-2,1 PRYLHBFRPPHQW21 PRYLHBFRPPHQWPRYLHBLG # PRYLHBLG

      *5283%< SDUHQWBLG

&UHDWH1HZ &RPPHQW
# XXLG 8QLTXHIGJHQHUDWHGE\EDFNHQGFRGH
,16(57,172 FRPPHQWFRPPHQWBLG ERG\ XVHUBLG 9$/8(6 # XXLG # ERG\ # XVHUBLG
,16(57,172 PRYLHBFRPPHQWFRPPHQWBLG PRYLHBLG 9$/8(6 # XXLG # PRYLHBLG



)HWFK,V: DWFKHG
6(/(&7&2817 )52 ZDWFK
      ,11(5-2,1 PRYLHBZDWFK21
            PRYLHBZDWFKVKRZBLG # PRYLHBLG
      :+(5( ZDWFKXVHUBLG # XVHUBLG

)HWFK,V5DWHG
6(/(&7UDWLQJ)52 UDWH
      ,11(5-2,1 PRYLHBUDWH21
            PRYLHBUDWHPRYLHBLG # PRYLHBLG$1'
            UDWHXVHUBLG # XVHUBLG
```

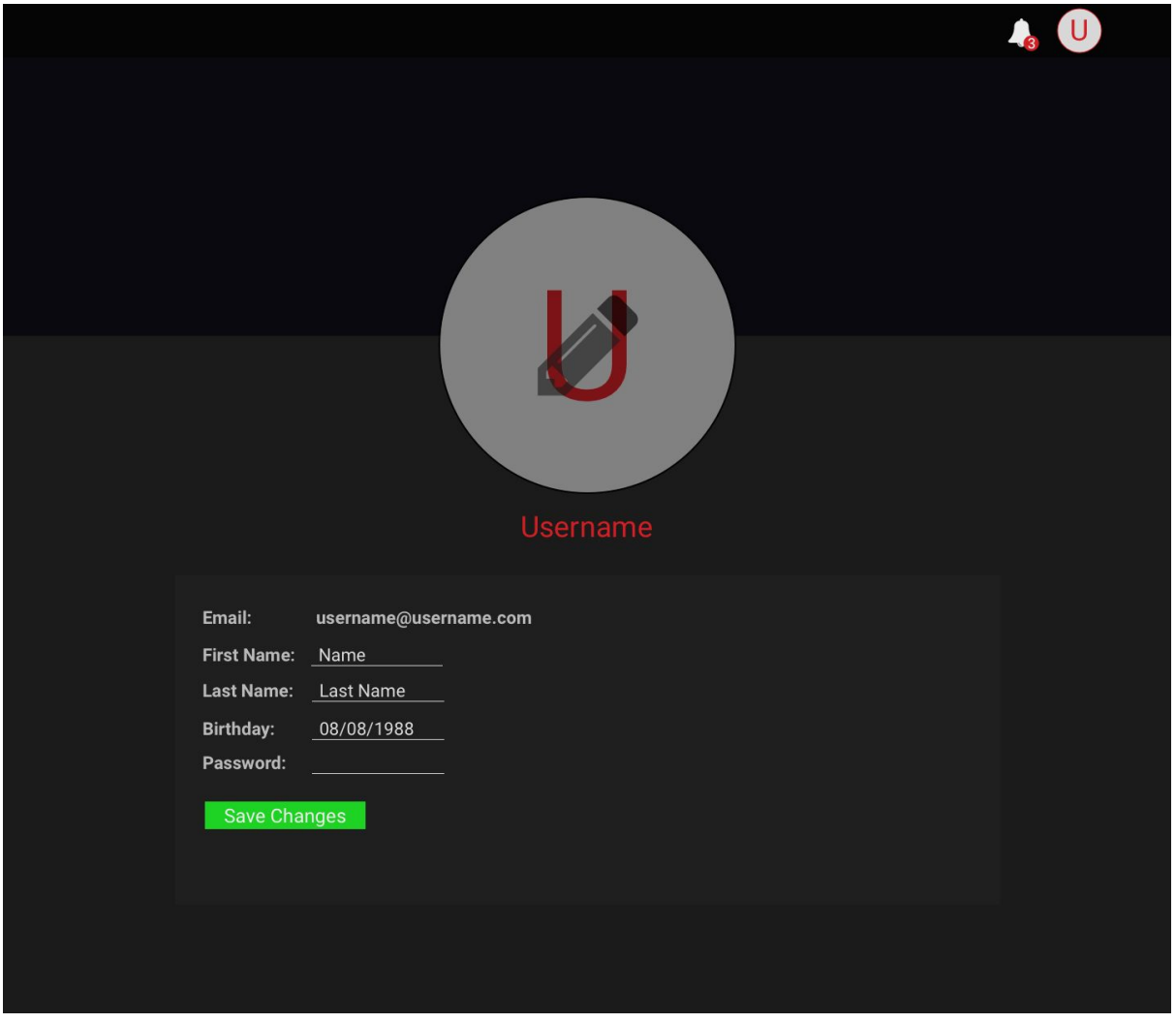
```
&DVW
6(/(&7 FDVW)520 DFW
      ,11(5-2,1 PRYLHBDFW21 DFWDFWBLG PRYLHBDFWDFWBLG
      ,11(5-2,1 FDVW21 FDVWFDVWBLG DFWFDVWBLG


5DWH0RYLH,I,WLVQ¶WUDWHG EHIRUH
# XXLG 8QLTXHIGJHQHUDWHG E\ EDFNHQG VFULSW

,16(57,172 UDWQJ UDWQJBLG XVHUBLG UDWQJ 9$/8(6 # XXLG # XVHUBLG # UDWQJ
,16(57,172 PRYLHBUDWQJ UDWQJBLG PRYLHBLG 9$/8(6 # XXLG# PRYLHBLG

5DWH0RYLH,I,WLV DOUHDG\ UDWHG
83'$7( UDWQJ6(7 UDWQJ # UDWQJ
      :+(5( UDWQJBLG,1
            6(/(&7 UDWQJBLG)520 VKRZBUDWH:+(5( PRYLHBLG # PRYLHBLG $1'
      XVHUBLG # XVHUBLG
```

## 8VHU3 URILOH




```
,QSXW # XVHUBLG
```

3 URFHVV : KHQ VKH 8 VHU3 URILOH VFUHHQ LV RSHQHG SUHYLRXVO FXUUHQWSKRWR RI XVHUDQG LQIRUP DWRQV UHODWHG WR XVHUDUH GLVSOD\ HG 8 VHUV FDQ FKDQJH DQG HGLWKHLULQIRUP DWRQV LQFOXGHV SDVVZ RUG DQG XVHUSKRWR

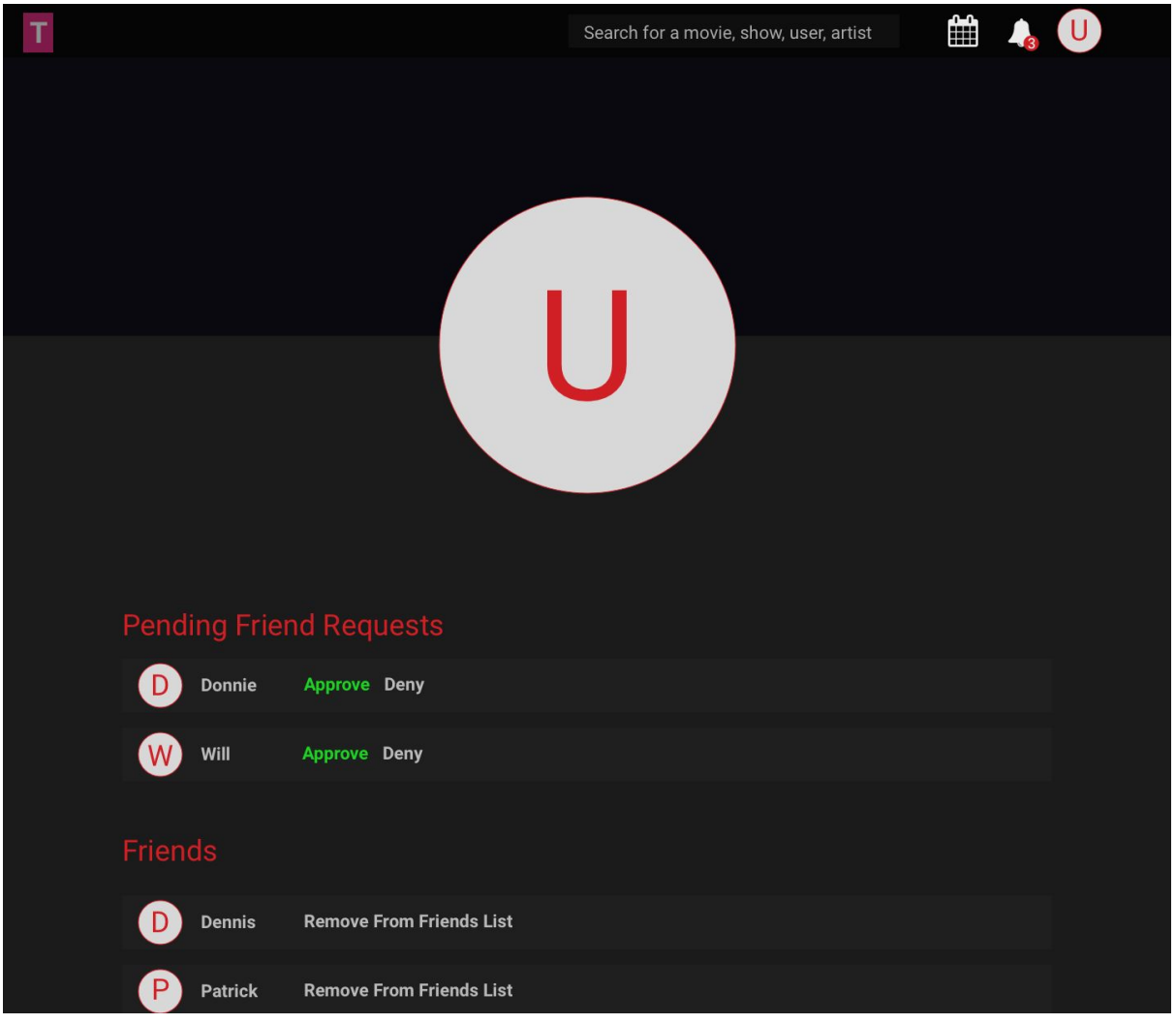
6 4 / 6 VDWMP HQW

) HWFK 8 VHU,QIR
* ( 7 XVHUBHP DLO XVHUBILUWQDP H XVHUBODVWBQDP H XVHUBELUWKGD\ ) 5 2 0 XVHU: +( 5 ( XVHUBLG # XVHUBLG

8 SGDWH 8 VHU

8 3' $7( XVHU6 ( 7 XVHUBHP DLO # XVHUBHP DLO XVHUBILUWQDP H # XVHUBILUWQDP H XVHUBODVWQDP H # XVHUBODVWQDP H XVHUBELUWKGD\ # XVHUBELUWKGD\ XVHUBSDVVZ RUG # XVHUBSDVVZ RUG: +( 5 ( XVHUBLG # XVHUBLG

## ) UHQGV




,QSXW # XVHUBLG # VHFRQGBXVHUBLG
3 URFHVV : KHQ VKH ) UHQGV VFUHHQ LV RSHQHG XVHUSKRWR SHQGLQJ IUHQG UHTXHVW DQG FXUUHQWUHQGV DUH GLVSOD\ HG 8 VHUFDQ DSSURYH RUGHQ\ VKHVH IUHQG UHTXHVW $ OVR XVHU FDQ UHP RYH DQ\ IUHQG IURP ) UHQGV / LVW

```
64/ 6WDWHPHQWV
)HWFK8VHUSKRWR

6(/(&7LPDJHBXUO)520XVHU:+(5(XVHUBLG  # XVHUBLG
 WKHQRSHQWKHSDWKDQGXSGDWHV

)HWFKLQJSHQGLQJIULHQGUHTXHVWV

6(/(&7XVHUBQDPHXVHUBPDLO)520XVHU:+(5(XVHUBLG
,1 6(/(&7VHFRQGBXVHUBLG)520IULHQGVKLS
:+(5(IULHQGVKLSBVWDWXV µ3(1',1*¶$1'IILVWBXVHUBLG  # XVHUBLG

)HWFKLQJFXUUHQWUHQGV

6(/(&7XVHUBQDPHXVHUBPDLO)520XVHU:+(5(XVHUBLG
,1 6(/(&7VHFRQGBXVHUBLG)520IULHQGVKLS
:+(5(IULHQGVKLSBVWDWXV µ$33529('¶$1'IILVWBXVHUBLG  # XVHUBLG

5HMHFWLQJIULHQGVKLSUHTXHVW

83'$7(IULHQGVKLS
6(7VWDWXV µ5(-(&7('¶
:+(5(IILVWBXVHUBLG  # XVHUBLG$1'VHFRQGBXVHUBLG  # VHFRQGBXVHUBLG

$FFHSWLQJIULHQGVKLSUHTXHVW

83'$7(IULHQGVKLS
6(7VWDWXV µ$33529('¶
:+(5(IILVWBXVHUBLG  # XVHUBLG$1'VHFRQGBXVHUBLG  # VHFRQGBXVHUBLG
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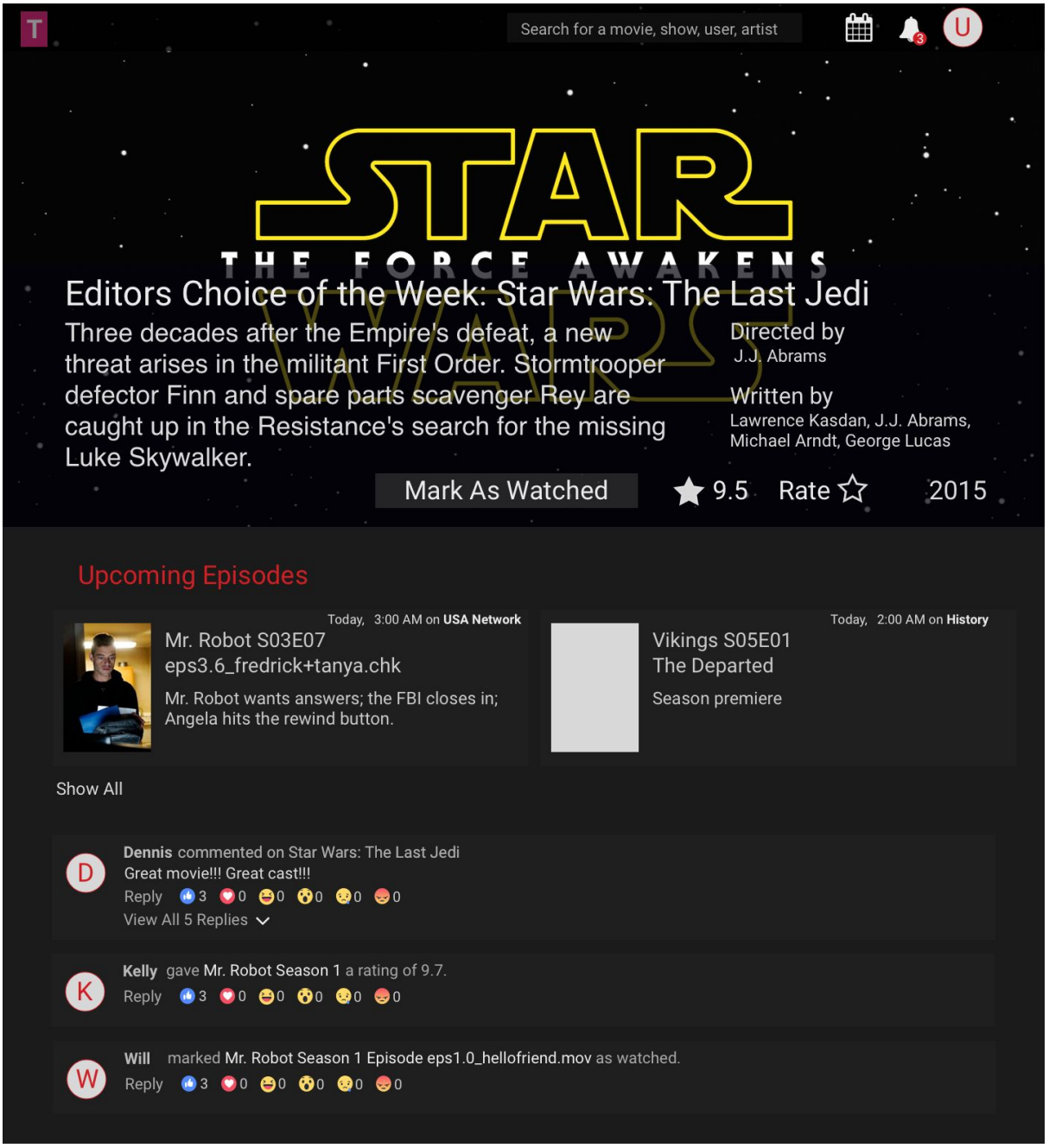
+ RP HSDJH

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64/ 6WDWMP HQW
) UHQGV¶\$ FWLYLW ) HHG

```
8SFRPLQJ(SLVRGHV
6(/(&7HSLVRGH)520HSLVRGH
      ,1(5-2,1VFKHGXOHIGBHSLVRGH21
            HSLVRGHHSLVRGHBLG VFKHGXOHIGBHSLVRGHHSLVRGHBLG
      ,1(5-2,1PHGLXP21PHGLXPPHGLXPBLG VFKHGXOHIGBHSLVRGHHSLVRGHBLG
      :+(5(
      '$7(VFKHGXOHIGBHSLVRGHWLPH%(7:((1
            &85'$7( $1' &85'$7( LQWHUYDO GD\
      25'(5%<VFKHGXOHIGBHSLVRGHWLPH'(6&

1RWLFDWLRQV
6(/(&7 )520 QRWLFDWLRQ:+(5(XVHUBLG #XVHUBLG$1' VHHQBDW6 18//

)UHQG)HHG

      /DWHVW&RPPHQWV
            (SLVRGH&RPPHQWV
            6(/(&7FRPPHQW HSLVRGH )520 FRPPHQW
            ,1(5-2,1 HSLVRGHBFRPPHQW21
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            ,1(5-2,1 SXEOLFBXVHU21 FRPPHQWXVHUBLG SXEOLFBXVHUXVHUBLG
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                  6(/(&7VHFRQGBXVHUBLG)520IUHQGVKLS:+(5(
                        ILUVWBXVHUBLG #XVHUBLG$1'
                        IUHQGVKLSBVWDWXV µ$33529('¶


            6HDVRQ&RPPHQWV
            6(/(&7FRPPHQW HSLVRGH )520 FRPPHQW
            ,1(5-2,1 VHDVRQBFRPPHQW21
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            ,1(5-2,1 SXEOLFBXVHU21 FRPPHQWXVHUBLG SXEOLFBXVHUXVHUBLG
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                        ILUVWBXVHUBLG #XVHUBLG$1'
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            6KRZ&RPPHQWV
            6(/(&7FRPPHQW HSLVRGH )520 FRPPHQW
            ,1(5-2,1 VKRZBFRPPHQW21
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            ,1(5-2,1 VKRZ21
```

```
        VKRZ VKRZBLG  VKRZBFRP P HQWVKRZBLG
,11(5-2,1 SXEOLFBXVHU21 FRP P HQWXVHUBLG  SXEOLFBXVHUXVHUBLG
: +(5( FRP P HQWXVHUBLG,1
        6(/(&7 VHFRQGBXVHUBLG)520 IURPGVKLS: +(5(
                ILOWHUBXVHUBLG  # XVHUBLG$1'
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0RYLH&RPP P HQWV
6(/(&7 FRP P HQW HSLVRGH )520 FRP P HQW
,11(5-2,1 P RYLHBFRP P HQW21
        FRP P HQWFRP P HQWBLG  P RYLHBFRP P HQWFRP P HQWBLG
,11(5-2,1 P RYLH21
        P RYLH P RYLHBLG  P RYLHBFRP P HQWVKRZBLG
: +(5( FRP P HQWXVHUBLG,1
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/DWHVW DWFKHV

(SLVRGH DWFKHV
6(/(&7 ZDWFK HSLVRGH )520 ZDWFK
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: +(5( ZDWFK XVHUBLG,1
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6HDVRQ DWFKHV
6(/(&7 ZDWFK HSLVRGH )520 ZDWFK
,11(5-2,1 VHDVRQBZDWFK21
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,11(5-2,1 VHDVRQ21
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: +(5( ZDWFK XVHUBLG,1
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                IURPGVKLSBVWDWXV  µ$33529('¶
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```
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6(/(&7 ZDW7K  HSLVRGH )520 ZDW7K
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,11(5-2,1 VKRZ 21
      VKRZ VKRZBLG  VKRZBZDW7K VKRZBLG
,11(5-2,1 SXE0FBXVHU21 ZDW7K XVHUBLG  SXE0FBXVHUXVHUBLG
: +(5( ZDW7K XVHUBLG,1
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      9$/8(6 # XXLG # UHDFWRQBWVSH # XVHUBLG

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,16(57,172 FRPPHQWBUHDFWRQZDW7KBLG UHDFWRQBLG 9$/8(6 # FRPPHQWBLG # XXLG
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,16(57,172 FRPPHQWFRPPHQWBLG ERG\ XVHUBLG
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&UHDWH&RP P HQW5HSO\
# XXLG  8QLTXH LGJHQHUDWHG E\ EDFNHQG VFULSW

,16(57,172 FRP P HQWFRP P HQWBLG ERG\ XVHUBLG SDUHQWBLG
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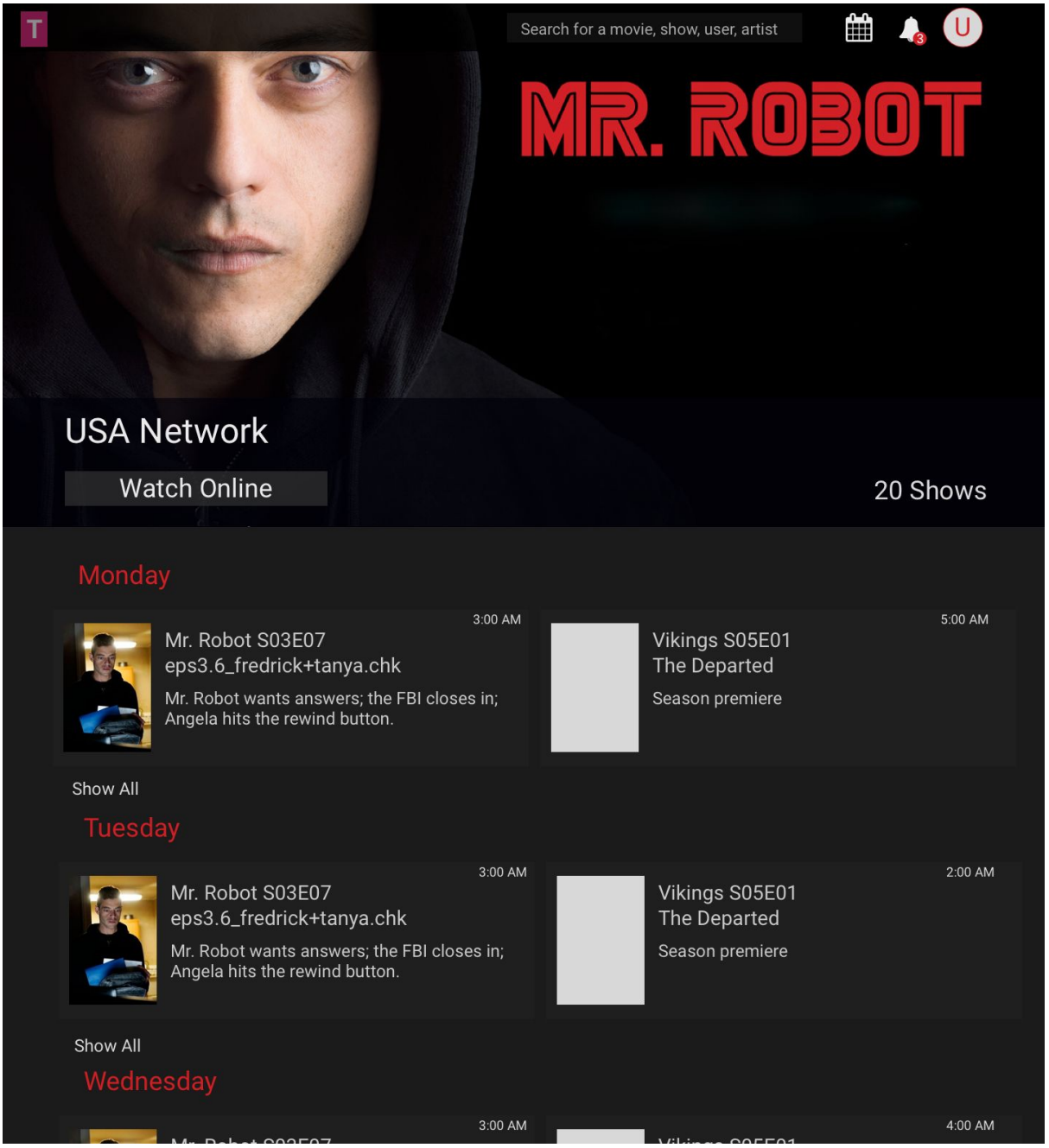
## 0 HGLXP

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,QSXW # P HGLXP BLG
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64 / 6 WDWHP HQW

) HWFK DOOWKH DYDLODEOH HSLVRGHV RQ FKDQQHO

6( / ( &7 HSLVRGHBQDP H HSLVRGHBLQIR WDLOHUBXUO GDWH ) 5 2 0 HSLVRGH
1 $ 7 8 5 $ / - 2 ,1
6( / ( &7 HSLVRGHBLG ' $ 7( WLP H DV GDWH ) 5 2 0 VFKHGXOHGBHSLVRGH
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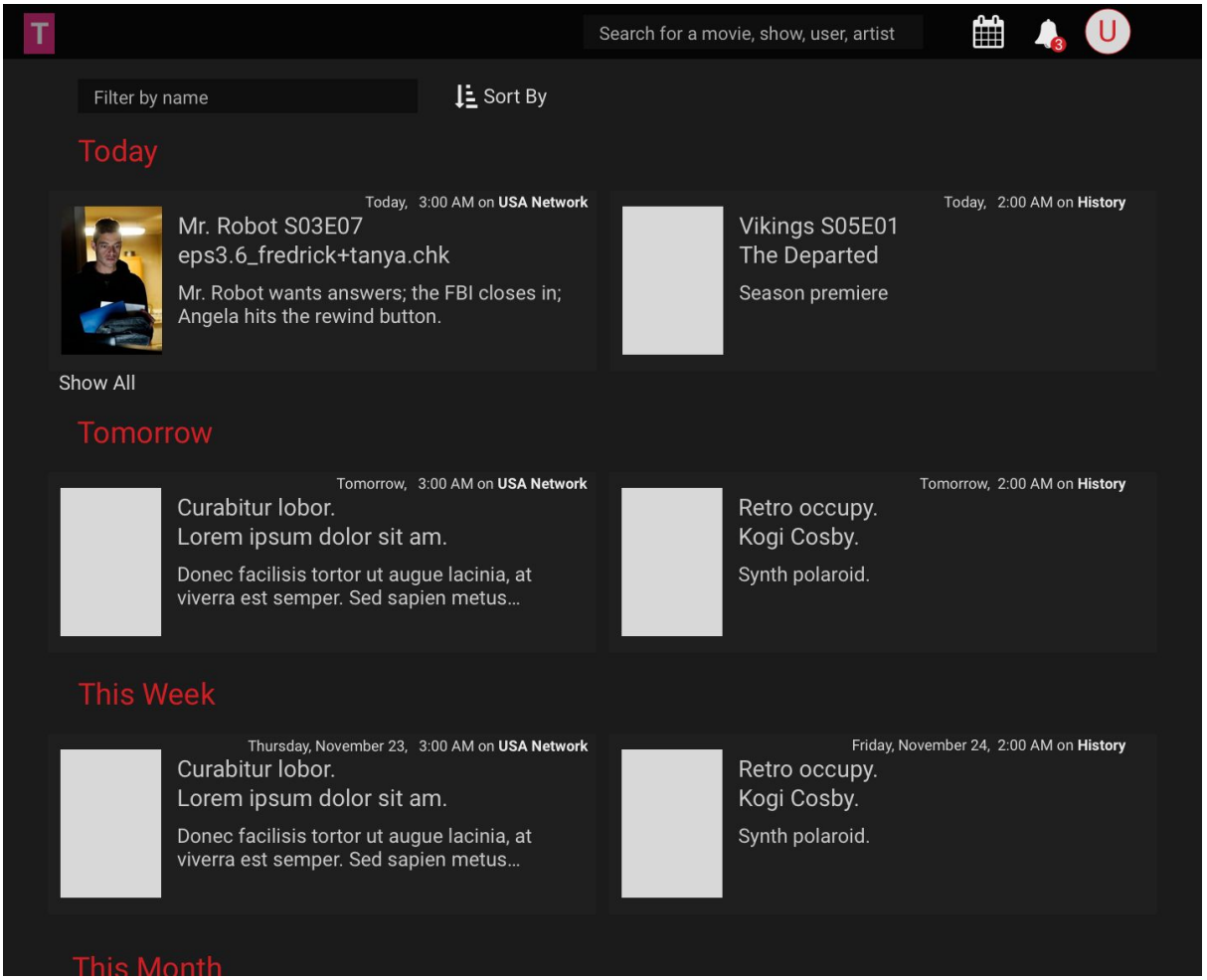
& DOHQGDU9 LHZ



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VKRZV DQG P RYLHV 8VHUFDQ VRUWWKRZ V DQG P RYLHV E\ WKHLUEURDGFDVWGDWD %HMLGHV XVHU
FDQ IILOWUVKRZ V DQG P RYLHV E\ WKHLUQDP HV IRUGHWDLOHG VHDUFK

64/ 6WDWHPHQWV

) HWFK $ OO6KRZ V Z LWK 7KHLU%URDGFDVW' DWHV

6(/(&7 )52 0 VKRZ
1$785$/ -2,1
 6(/(&7 HSLVRGHBLG ' $7( WP H DV GDWH)52 0 VFKHGXOHGBHSLVRGH
* 5283 %< GDWH

) LOWU6KRZ E\ %URDGFDVW' DWH
6(/(&7 )52 0 VKRZ
1$785$/ -2,1
 6(/(&7 HSLVRGHBLG ' $7( WP H DV GDWH)52 0 VFKHGXOHGBHSLVRGH
* 5283 %< GDWH
25' (5 %<
&$6( : +(1 # RUGHUE\ µ$6&¶7+(1 GDWH(1' $6&
&$6( : +(1 # RUGHUE\ µ( 6&¶7+(1 GDWH(1' '(6&

) LOWU0 RYLH E\ %URDGFDVW' DWH

6(/(&7 )52 0 P RYLH
25' (5 %<
&$6( : +(1 # RUGHUE\ µ$6&¶7+(1 UHOHDVHBGDWH(1' $6&
&$6( : +(1 # RUGHUE\ µ( 6&¶7+(1 UHOHDVHBGDWH(1' '(6&

) LOWU6KRZ E\ 1DP H

6(/(&7 )52 0 VKRZ
1$785$/ -2,1
 6(/(&7 HSLVRGHBLG ' $7( WP H DV GDWH)52 0 VFKHGXOHGBHSLVRGH
* 5283 %< GDWH
25' (5 %<
&$6( : +(1 # RUGHUE\ µ$6&¶7+(1 VKRZBQDP H(1' $6&
&$6( : +(1 # RUGHUE\ µ( 6&¶7+(1 VKRZBQDP H(1' '(6&


) LOWU0 RYLH E\ 1DP H

6(/(&7 )52 0 P RYLH
25' (5 %<
&$6( : +(1 # RUGHUE\ µ$6&¶7+(1 P RYLHBQDP H(1' $6&
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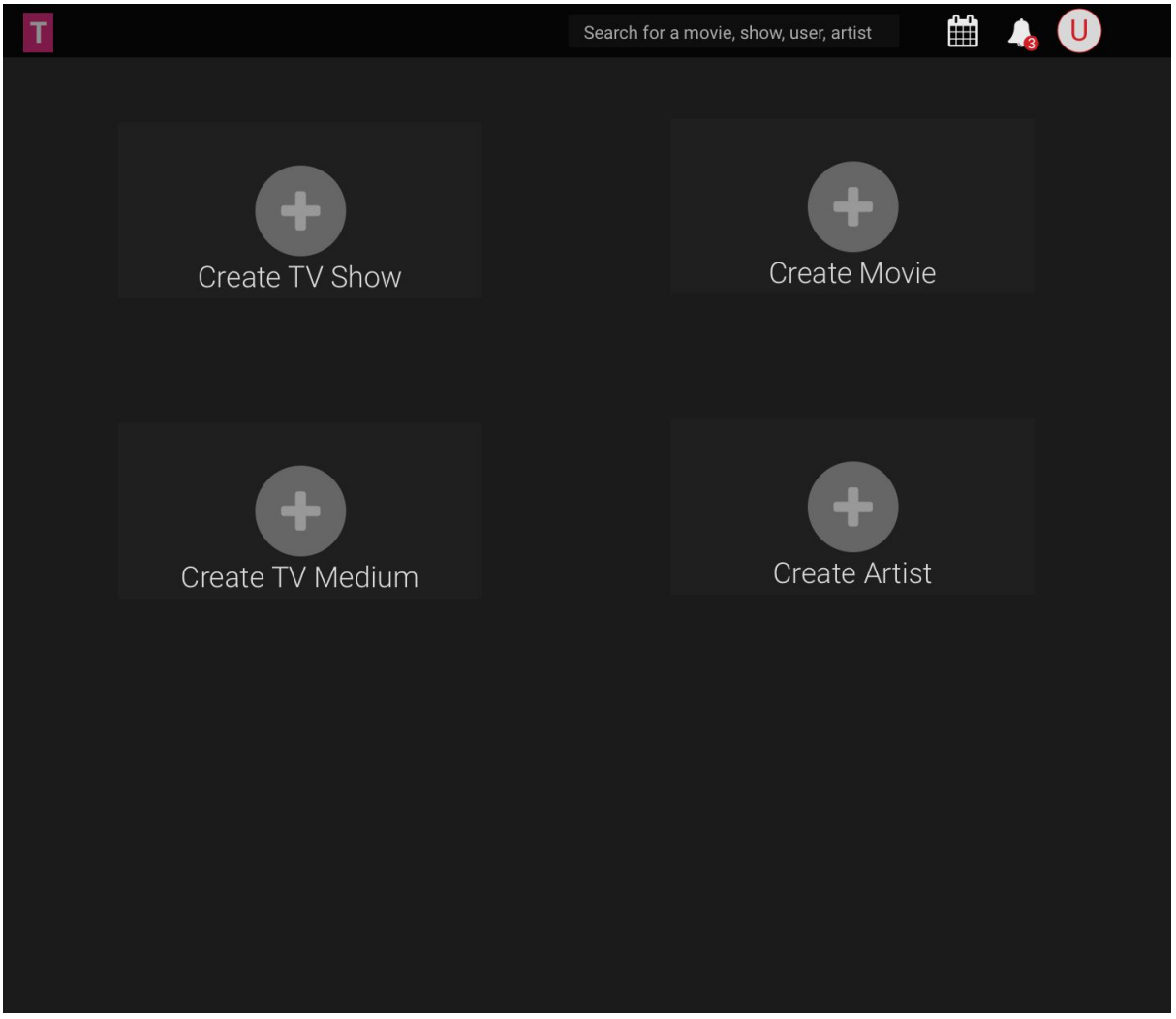


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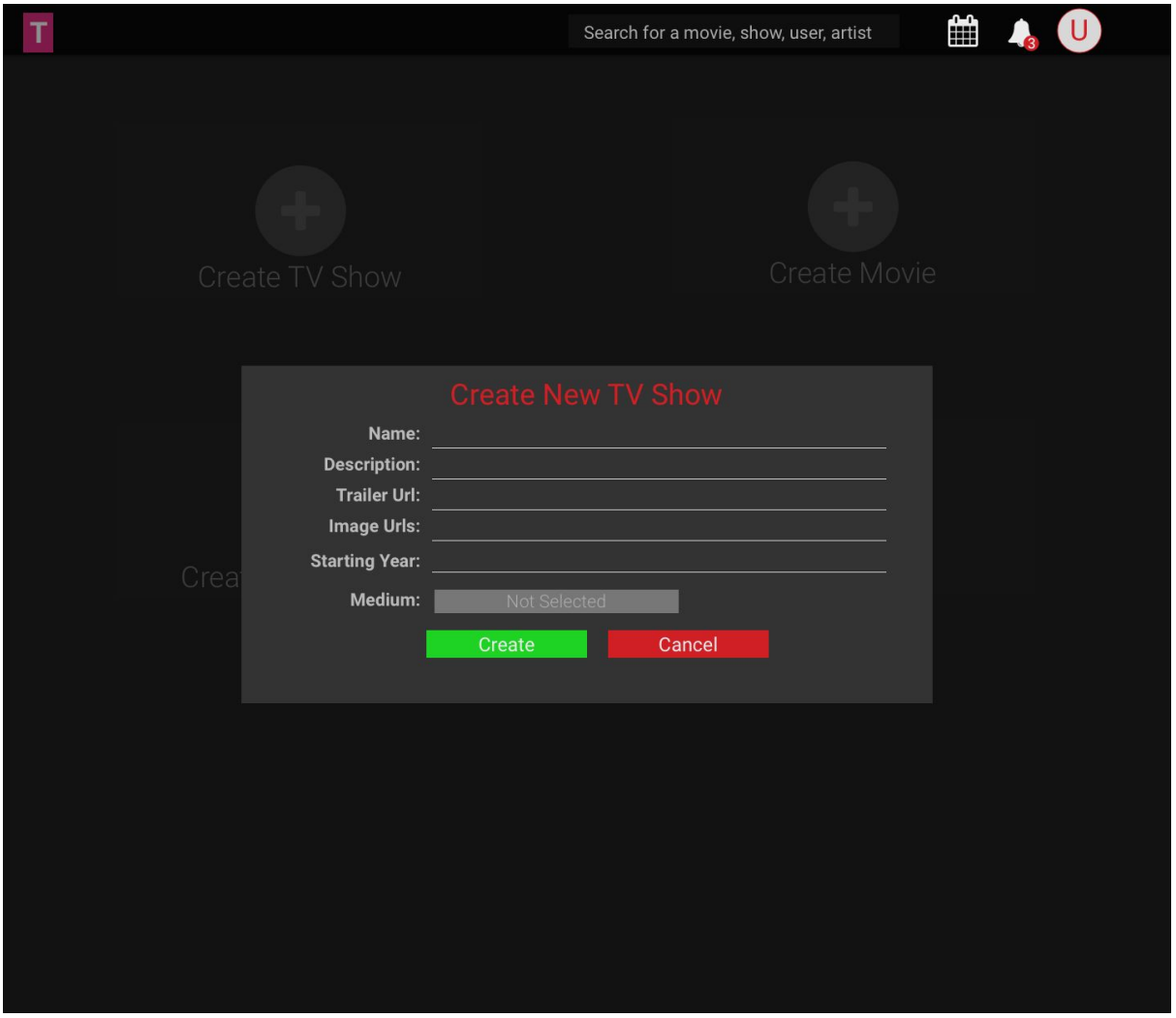


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64/ 6WDWHPHQW

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9$/8(6 # VKRZBQDPH # VKRZBLQIR # WDLOHUBXUO# VWDUWBHDU # PHGLXP # LPDJHBXUOY

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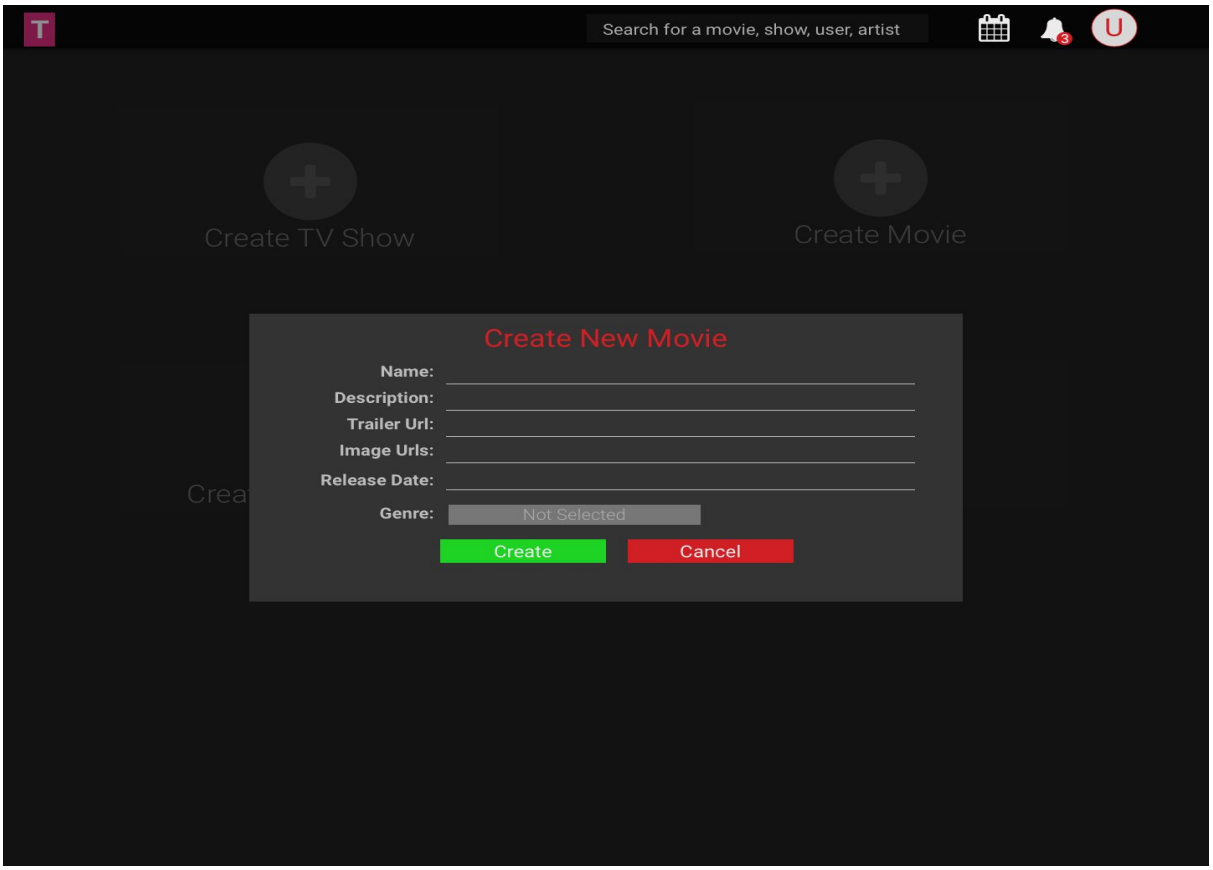


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64/ 6WDWHPHQWV

,16(57,172 PRYLH PRYLHBQDPH PRYLHBGHVFULSWLRQ JHQUH UHOHDVHBGDWH WUDLOHUBXUO LPDJHBXUOV 9$/8(6 # PRYLHBQDPH # PRYLHBGHVFULSWLRQ # JHQUH # UHOHDVHBGDWH # WUDLOHUBXUO# LPDJHBXUOV

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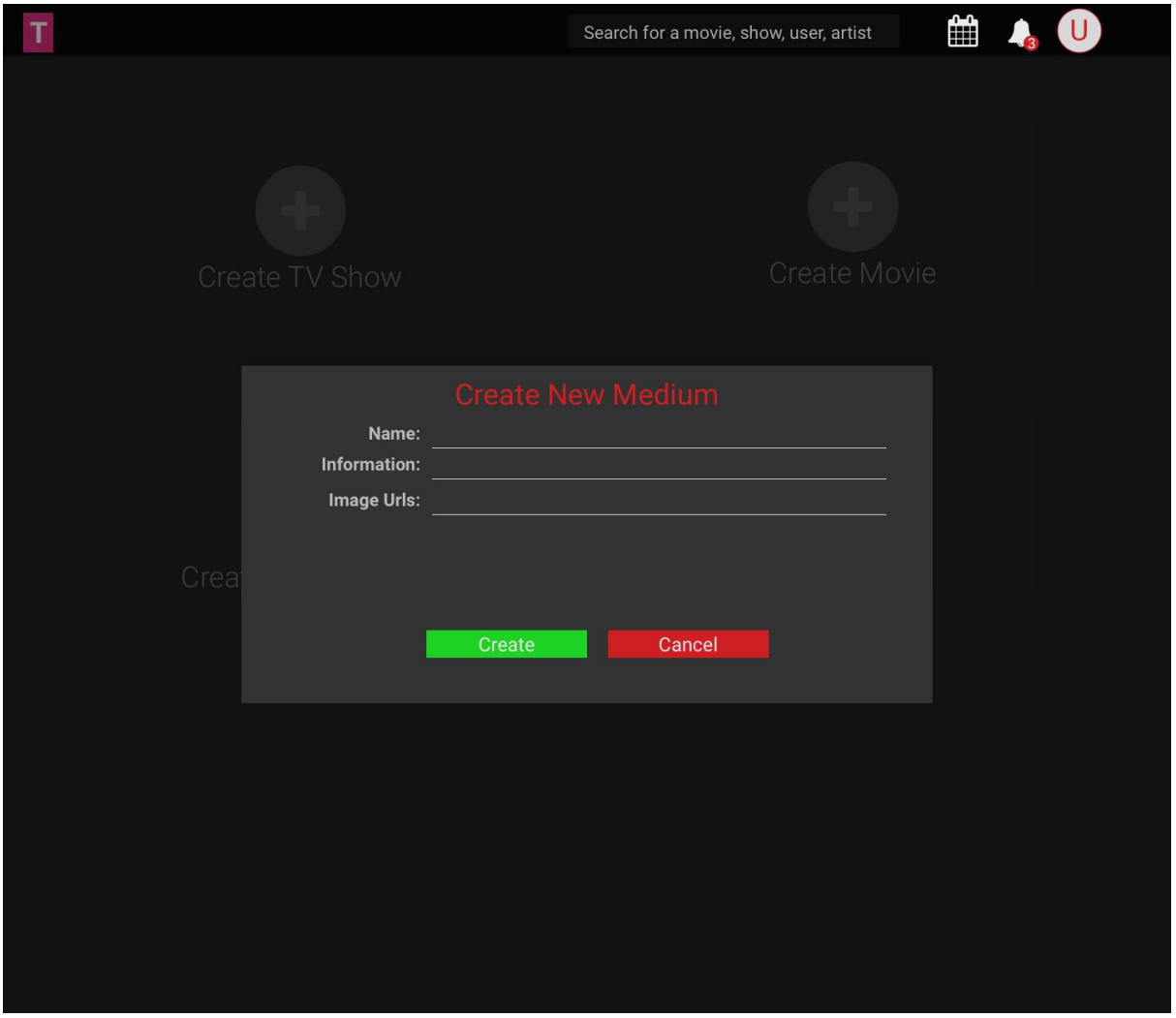


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64/ 6WDWHPHQW
,16(57,172 PHGLXP PHGLXPBQDPH PHGLXPBLQIR LPDJHBXUO
9$/8(6 #PHGLXPBQDPH #PHGLXPBLQIR #LPDJHBXUO

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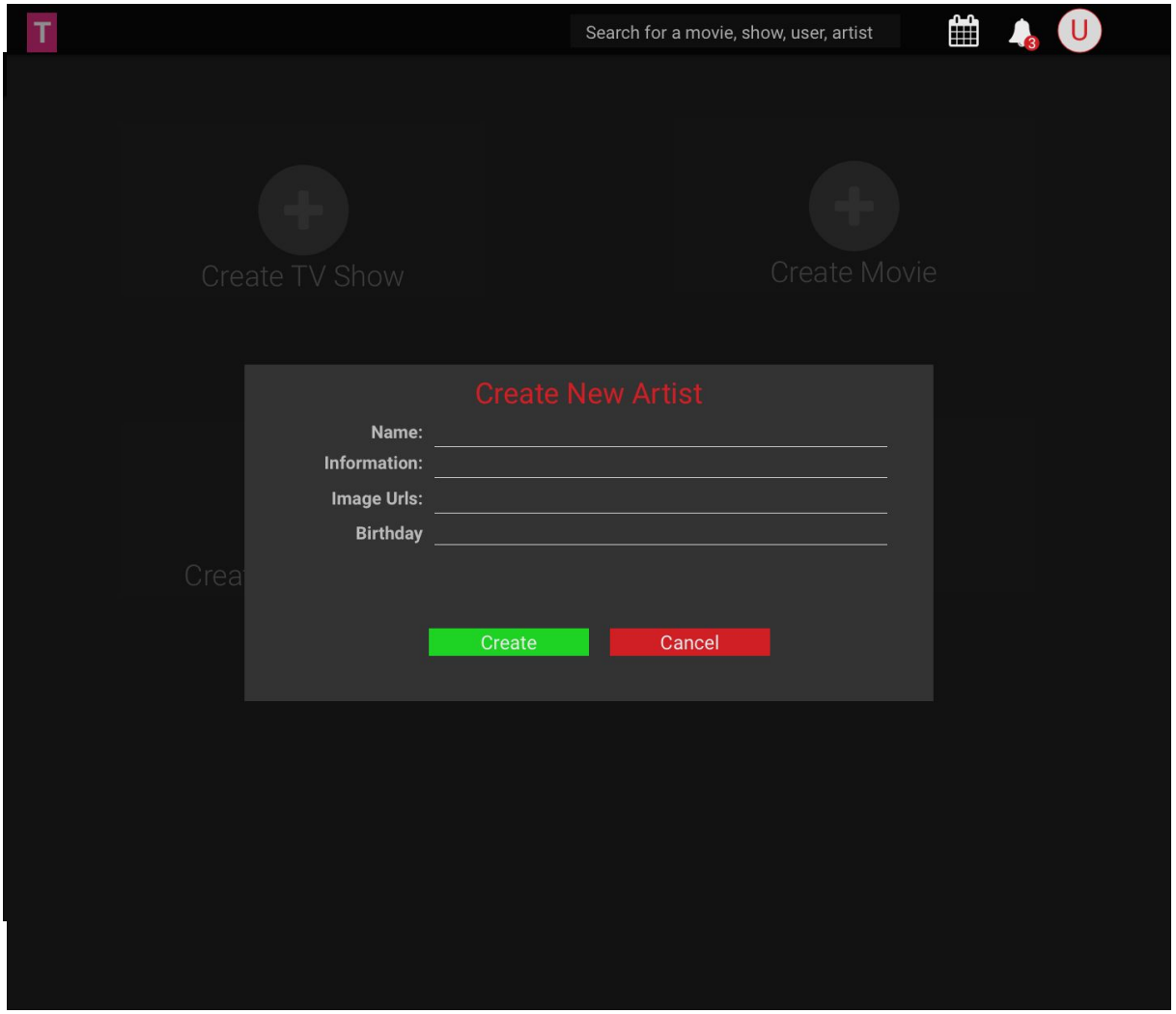


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64/ 6WDWHP HQW
,16(57 ,172 FDVHFDVHBQDPH FDVHBLQIR FDVHBELUWKGD\
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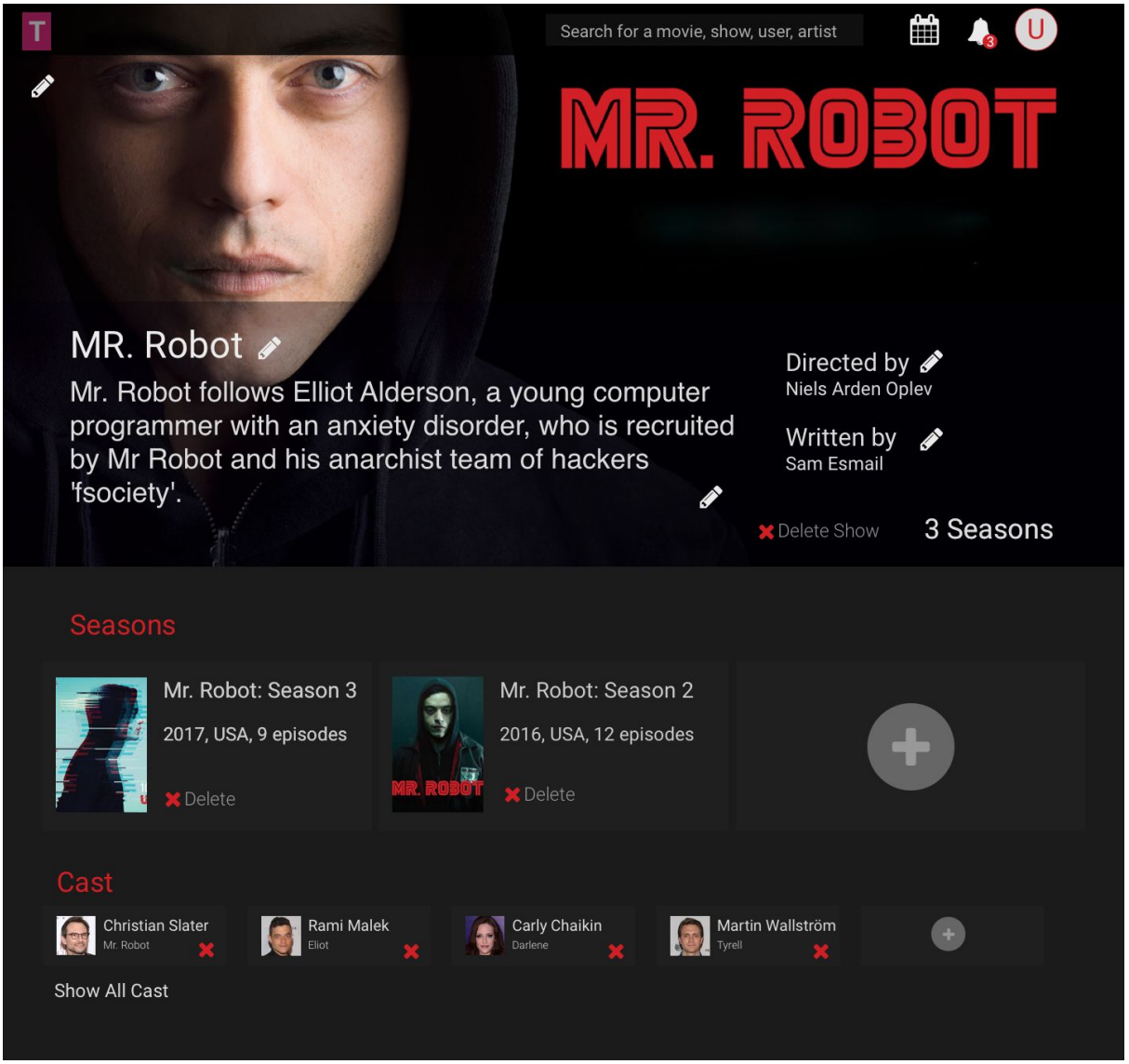
## 0 RGLL\ ' HOHWH 79 6KRZ

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# HSLVRGHBLQR # WDLOHUBXUO
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%\ FOHDQLQJ SHQLFRQV QHDUWKH LQIRUP DWRQ DGP LQFDQP DNH WKHP HGLWDEOH $IWHUP DNLQJ
WKHP HGLWDEOH DGP LQ FDQ FKDQJH WKHLUYDOXHV ,Q RUGHUWR GHOHWH WKH VKRZ RUHSLVRGH DGP LQ
FDQ SUHVV WKH ' HOHWH EXWWRQ &OHDQLQJ WKH SOXV EXWWRQ RSHQV XS WKH VHDVRQ FUHDWRQ P RGDO
%\ ILOOLQJ WKDWP RGDODGP LQ FDQ DGG QHZ VHDVRQV WR VKRZ %\ FOHDQLQJ UHG UHP RYH LFRQV
LQVLGH WKH VHDVRQ FDUGV DGP LQ FDQ UHP RYH VHDVRQV IURP VKRZ 6LP LODUO DGP LQ FDQ DGG RU
UHP RYH DUWLVWV WR FDWWRI VKRZ

64/ 6WDWH HQWV

' HOHWH 79 6KRZ

' (/(7( )52 VKRZ
: +(5( VKRZ BLG # VKRZ BLG

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8SGDWH HSLVRGHV

83'$7( HSLVRGH
6(7 WDJOHUBXUO # WDJOHUBXUO
HSLVRGHBQDPH # HSLVRGHBQDPH
HSLVRGHBLQIR # HSLVRGHBLQIR
LP DJHBXUO # LP DJHBXUO
: +(5( HSLVRGHBLG # HSLVRGHBLG

' HOHWH ( SLVRGH

' (/(7( )52 HSLVRGH
: +(5( HSLVRGHBLG # HSLVRGHBLG

## $GG' HOHWH 6FKHGXOHG ( SLVRGH

,QSXW # P HGLXP BLG # WP H # HSLVRGHBLG
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$1' WLPH # WLPH
WKLV GLVSOD\V WKH VFKHGXOHG HSLVRGHV DQG DGP LQP D\ VHH WKHP WR GHFLGH

' HOHWH VFKHGXOHG HSLVRGH IURP P HGLXP

'(/(7( )520 VFKHGXOHGBHSLVRGH
ZKHUH HSLVRGHBLG # HSLVRGHBLG
DGP LQP D\ FDQFHO VFKHGXOH

)HWFK XQVFKHGXOHG HSLVRGHV RQ P HGLXP

6(/(&7 WLPH)520 VKHGXOHGBHSLVRGH ZKHUH P HGLXP BLG # P HGLXP BLG
$1' WLPH ! # WLPH

6FKHGXOH HSLVRGH RQ P HGLXP

,16(57,172 VFKHGXOHGBHSLVRGH HSLVRGHBLG P HGLXP BLG WLPH
9$/8(6 # HSLVRGHBLG # P HGLXP BLG # WLPH

## 0RGLI\ ' HOHWH 0RYLH

,QSXW # P RYLHBLG EOQGHG WR µ¶EXWWRQ ! IRU' HOHWH
# P RYLHBLG # P RYLHBQDP H # P RYLHBGHVFULSWRQ # JHQUH # LP GEBUDWQJ
# WUDLOHUBXUO# UHOHDVHBGDWH ! IRU0RGI\

3URFHVV $GP LQFDQ GHOHWH WKH P RYLH IURP WKH GDWDEDVH E\ FDQFHOLQJ WKH µ¶EXWWRQ RQ WKH
P RYLH SDJH $OVR KH FDQ P RGI\ WKH DWWULEXWHV RI LW

64/ 6WDWHPHQWV

'(/(7( )520 P RYLH: +(5( P RYLHBLG # P RYLHBLG

83' $7( P RYLH
6(7 P RYLHBQDP H # P RYLHBQDP H
P RYLHBGHVFULSWRQ # P RYLHBGHVFULSWRQ
JHQUH # JHQUH
LP GEBUDWQJ # LP GEBUDWQJ
WUDLOHUBXUO # WUDLOHUBXUO

```
        UHQDPHBGDWD  # UHQDPHBGDWD
: +(5( PRYLHBLG  # PRYLHBLG
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## 0RGLI\'HOHWH&DVW

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    FDVWBLPDJHBXUO # FDVWBLPDJHBXUO
    FDVWBLQIR  # FDVWBLQIR
    FDVWBELUWKGD\  # FDVWBELUWKGD\
: +(5( FDVWBLG  # FDVWBLG
```

## 0RGLI\'HOHWH0HGLXP

```
,QSXW # PHGLXPBLG ! IRU'HOHWH
        # PHGLXPBLG # PHGLXPBQDPH # PHGLXPBLQIR # LPDJHBXUOY ! IRU0RGLI\

3URFHVV $GPLQFDQGHOHWH WKH PHGLXP IURP WKH GDWDEDVH E\ FOLFNLQJ WKH µ¶EXWWRQ RQ WKH
FDVW PHPEHUSDJH $OVR KH FDQ PRGLI\ WKH DWWULEXWHV RI LW

64/ 6WDWHPHQWV
'(/(7( )520 PHGLXP : +(5( PHGLXPBLG  # PHGLXPBLG

83'$7( PHGLXP
6(7 PHGLXPBQDPH  # PHGLXPBQDPH
    LPDJHBXUOY  # LPDJHBXUOY
    PHGLXPBLQIR  # PHGLXPBLQIR
: +(5( PHGLXPBLG  # PHGLXPBLG
```

# $GYDQFHG ' DWDEDVH &RP SRQHQWV

## 9LHZV

```
3XEOLF 8VHU
        &5($7( 9,(: SXEOLFBXVHU$6
                6(/(&7 XVHUBLG XVHUBQDPH DJH DYDLODEOHP DJHBLG XVHUBILUVWQDPH
                        8VHUBODVWQDPH)52 XVHU: +(5( XVHUBWSH ! µ$GPLQ¶
```

## 6WRUHG 3URFHGXUHV

```
)X]]\ 6HDUFK
        ,WDOORZV VWRVHDUFK IRUDQ DUELWDU VWULQJ LWVHOXQV P RVWVLP LODUP RYLHQDP HV
WV VKRZ QDP HV XVHUQDP HV HWF VRUWHG E\ WKHLUVLP LODULWV YDOXH 7KLV VLP LODULWV FDQ EH
FDOFXODWHG ZLWK OHYHQVKWHLQ GLVWDQFH
```

## 5HSRUWV

```
0RVW DWWKHG 6KRZV
6(/(&7 VKRZBQDP H &2817 DV ZDWKBFRXQW)52 VKRZ
        ,1(5-2,1 VKRZBZDWK21
                VKRZ VKRZBLG VKRZBZDWK VKRZBLG
        *5283 %< VKRZBQDP H
        25'(5 %< ZDWKBFRXQW'(6&

0RVW$FWLYH0HGLXP V
6(/(&7 P HGLXPBQDP H &2817 DV VFKHGXOHGBHSLVRGHBFRXQW)52 P HGLXP
        ,1(5-2,1 VFKHGXOHGBHSLVRGH21
                VFKHGXOHGBHSLVRGH P HGLXPBLG P HGLXP P HGLXPBLG
        *5283 %< P HGLXPBQDP H
        25'(5 %< VFKHGXOHGBHSLVRGHBFRXQW'(6&

0RVW$FWLYH8VHUV
6(/(&7 XVHUQDP H &2817 DV ZDWKBFRXQW)52 XVHU
        ,1(5-2,1 ZDWK21 ZDWK XVHULD XVHUXVHULD
        *5283 %< XVHUQDP H
        25'(5 %< ZDWKBFRXQW'(6&
```

## 7 UJJ HUV

- : KHQ D FRP P HQWRUUHDFWRQ P DGH WR D XVHU¶V DFWLYLW V\ VWMP FUHDWMV D QHZ QRWLFDWRQ WKDWEHORQJ V WR D XVHUZ LWK UHODWMG WM[ WDQG OQN DWWEXWMV
- : KHQ D VKRZ LV GHOHWMG V\ VWMP Z LOOGHOHWM DOOVXEVFUSWRQV WR WKDWVKRZ
- : KHQ DQ HSLVRGH LV GHOHWMG V\ VWMP Z LOOGHOHWM DOO6 FKHGXOHG( SLVRGHV UHODWMG WR WKDWHSLVRGH

## &RQVWUDLQWV

- 8 VHUV DQG DGP LQV P XVWEH DXWKHQWFDWMG EHIRUH XVLQJ WKH 7 UDFNE\ P H
- 8 VHUV¶VHQVLWLYH LQIRUP DWRQ DQG FUHGHQWDOV P XVWEH HQFU SWMG EHIRUH VWRUHG LQ RXU GDWDEDVH
- 8 VHUV P XVWUHDG DQG DFFHSWWKH SULYDF\ GDWD SROF\ DJ UHHP HQWV EHIRUH XVLQJ WKH DSSOFDWRQ
- 2 QO DGP LQV FDQ P RGLI\ GHOHWM P RYLHV 79 VHULHV FRP P HQWV 1 RUP DOXVHUV FDQQRW EH DEOH WR GR DQ\ NLQG RI XQDXWKRUL HG DFWRQV
- : KHQ DQ\ NLQG RI P RYLH HSLVRGH P HGLXP RU79 VHULHV GHOHWMG IURP WKH GDWDEDVH WKH DOOUHVSHFWLYH UHODWRQV Z LOOEH GHOHWMG VLP XOWDQHRXVO ) RULQVWDQFH LL DGP LQ GHOHWM³&DUV´ P RYLH FRP P HQWV UDWQJ YDOXH GLVFXVVLRQV DERXW³&DUV´ Z LOODOVR EH GHOHWMG
- 8 VHUFDQQRWP DUN P RYLHV HSLVRGHV DV Z DWFKHG EHIRUH WKHLUDLUGDWM
- 8 VHUFDQQRWJ LYH P XOWSOH UDWQJ V WR RQH VKRZ KH FDQ RQO FKDQJ H WKH SUHYLRXV UDWQJ
- 8 VHUFDQQRWP DNH XQOP LWMG FRP P HQWV WKDWFDXVH VSDP P LQJ

# ,P SOHP HQWDWLRQ 3 ODQ

: H KDYH GHFLGHG WR XVH IROORZ LQJ WHFKQRORJLHV IRUWKH UHVSHFWLYH SDUWV RI WKH DSSOFDWLRQ

) URQWHQG 5 HDFWW

%DFNHQG 0 LFUR VHUYLFHV IRUHDFK RI WKH RSHUDWLRQV 7 KHVH VHUYLFHV FDQ EH LP SOHP HQWHG
Z LWK GLLIHUHQWSURJUDP P LQJ ODQJ XDJHV IUDP HZ RUNV 1 RGH IW * R 3 \ WKRQ 6 SULQJ

6 WRUDJH 3 RVWJUH 6 4 /