Group 8

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Software VALIDATIONs

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# System Architecture

The system architecture is shown below:



# T1: Unit Test

## T1.1: StartDB Unit Test

### T1.1.1: Test getStartPosition ()

function position = getStartPosition(process)

    switch process.mode

        case 'hengdaolima' Tcover1.1.1.1

            position = {[105 305 190 190],[5 305 90 190],[305 305 90 190],...

                 [5 105 90 190],[305 105 90 190],[105 205 190 90],...

                 [5 5 90 90],[105 105 90 90],[205 105 90 90],[305 5 90 90]};

        case 'qitoubingjin' Tcover1.1.1.2

            position = {[105 305 190 190],[5 305 90 190],[305 305 90 190],...

                 [5 5 90 190],[305 5 90 190],[105 105 190 90],...

                 [5 205 90 90],[105 205 90 90],[205 205 90 90],[305 205 90 90]};

        case 'bingfensanlu' Tcover1.1.1.3

            position = {[105 305 190 190],[5 205 90 190],[305 205 90 190],...

                 [5 5 90 190],[305 5 90 190],[105 205 190 90],...

                 [5 405 90 90],[305 405 90 90],[105 105 90 90],[205 105 90 90]};

        case 'weierbujian' Tcover1.1.1.4

            position = {[105 305 190 190],[5 305 90 190],[5 105 90 190],...

                 [105 5 90 190],[205 5 90 190],[105 205 190 90],...

                 [305 105 90 90],[305 205 90 90],[305 305 90 90],[305 405 90 90]};

        case 'jiezuxiandeng' Tcover1.1.1.5

            position = {[105 305 190 190],[5 5 90 190],[105 5 90 190],...

                 [205 5 90 190],[305 5 90 190],[105 205 190 90],...

                 [5 405 90 90],[5 305 90 90],[305 305 90 90],[305 405 90 90]};

        case 'test' Tcover1.1.1.6

            position={[5 105 190 190],[5 305 90 190],[105 305 90 190],...

                 [305 305 90 190],[305 105 90 190],[205 5 190 90],...

                 [205 305 90 90],[205 105 90 90],[5 5 90 90],[105 5 90 90]};

        case 'diy' Tcover1.1.1.7

            position = process.diyPosition;

    end

 end

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T1.1.1.1 |
| Coverage Item | Tcover1.1.1.1 |
| Input | None |
| State | db.mode = 'hengdaolima'; |
| Expected Output | od = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.2 |
| Coverage Item | Tcover1.1.1.2 |
| Input | None |
| State | db.mode = 'qitoubingjin'; |
| Expected Output | od = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 5 90 190], [305 5 90 190], [105 105 190 90], [5 205 90 90], [105 205 90 90], [205 205 90 90], [305 205 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.3 |
| Coverage Item | Tcover1.1.1.3 |
| Input | None |
| State | db.mode = 'bingfensanlu'; |
| Expected Output | od = {[105 305 190 190], [5 205 90 190], [305 205 90 190], [5 5 90 190], [305 5 90 190], [105 205 190 90], [5 405 90 90], [305 405 90 90], [105 105 90 90], [205 105 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.4 |
| Coverage Item | Tcover1.1.1.4 |
| Input | None |
| State | db.mode = 'weierbujian'; |
| Expected Output | od = {[105 305 190 190], [5 305 90 190], [5 105 90 190], [105 5 90 190], [205 5 90 190], [105 205 190 90], [305 105 90 90], [305 205 90 90], [305 305 90 90], [305 405 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.5 |
| Coverage Item | Tcover1.1.1.5 |
| Input | None |
| State | db.mode = 'jiezuxiandeng'; |
| Expected Output | od = {[105 305 190 190], [5 5 90 190], [105 5 90 190], [205 5 90 190], [305 5 90 190], [105 205 190 90], [5 405 90 90], [5 305 90 90], [305 305 90 90], [305 405 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.6 |
| Coverage Item | Tcover1.1.1.6 |
| Input | None |
| State | db.mode = 'test'; |
| Expected Output | od = {[5 105 190 190], [5 305 90 190], [105 305 90 190], [305 305 90 190], [305 105 90 190], [205 5 190 90], [205 305 90 90], [205 105 90 90], [5 5 90 90], [105 5 90 90]}; |

|  |  |
| --- | --- |
|  | Test Case T1.1.1.7 |
| Coverage Item | Tcover1.1.1.7 |
| Input | None |
| State | db.mode = 'diy';  db.diyPosition = {[5 105 190 190], [5 305 90 190],[105 305 90 190], [305 305 90 190], [305 105 90 190], [205 5 190 90], [205 305 90 90], [205 105 90 90], [5 5 90 90], [105 5 90 90]}; |
| Expected Output | od = {[5 105 190 190], [5 305 90 190], [105 305 90 190], [305 305 90 190], [305 105 90 190], [205 5 190 90], [205 305 90 90], [205 105 90 90], [5 5 90 90], [105 5 90 90]}; |

* Test coverage: 7/7=100%
* Test result: 7 passed

## T1.2: GameProcess Unit Test

### T1.2.1: Test transMatrix ()

function board = transMatrix(~,position) Tcover1.2.1.1

    % translate the board into a 4\*5 matrix

    board = zeros(5,4);

    %2\*2

    item = position{1};

    y = (item(1)-5)/100+1;

    x = (item(2)-5)/100+1;

    board(5-x:6-x,y:y+1) = [1,1;1,1];

    %1\*2

    item = position{6};

    y = (item(1)-5)/100+1;

    x = (item(2)-5)/100+1;

    board(6-x,y:y+1) = [6,6];

    %2\*1

    for i = 2:5

        item = position{i};

        y = (item(1)-5)/100+1;

        x = (item(2)-5)/100+1;

        board(5-x:6-x,y) = [i;i];

    end

    %1\*1

    for i = 7:10

        item = position{i};

        y = (item(1)-5)/100+1;

        x = (item(2)-5)/100+1;

        board(6-x,y) = i;

    end

end

* Coverage Criteria: Statement coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T1.2.1.1 |
| Coverage Item | Tcover1.2.1.1 |
| Input | position = {[105 305 190 190],[5 305 90 190],[305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |
| State | Any |
| Expected Output | od = [2 1 1 3; 2 1 1 3; 4 6 6 5; 4 8 9 5; 7 0 0 10]; |

* Test coverage: 1/1=100%
* Test result: 1 passed

### T1.2.2: Test getCurrentChess ()

function currentchess = getCurrentChess(~,id,position) Tcover1.2.2.1

    % get the position of the chess

    currentchess = position(id);

end

* Coverage Criteria: Statement coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T1.2.2.1 |
| Coverage Item | Tcover1.2.2.1 |
| Input | id = 1;  positions = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |
| State | Any |
| Expected Output | od = {[105 305 190 190]}; |

* Test coverage: 1/1=100%
* Test result: 1 passed

### T1.2.3: Test move ()

function nextPosition = move(process,clickPoint)

    currentChess = process.chessDB.currentChess{1};

    if (1<clickPoint(1)&&clickPoint(1)<399)&&(1<clickPoint(2)&&clickPoint(2)<499)

        %2\*2

        if currentChess(3)==190 && currentChess(4)==190

            %up

            if clickPoint(1)-currentChess(1) >0 && clickPoint(1)-currentChess(1) <200 ...

                && clickPoint(2)-currentChess(2)>200 && clickPoint(2)-currentChess(2)<300     Tcover1.2.3.1

                nextPosition=[currentChess(1) currentChess(2)+100 currentChess(3) currentChess(4)];

            %down

            elseif clickPoint(1)-currentChess(1)>0 && clickPoint(1)-currentChess(1)<200 ...

                && clickPoint(2)-currentChess(2)<0 && clickPoint(2)-currentChess(2)>-100      Tcover1.2.3.2

                nextPosition=[currentChess(1) currentChess(2)-100 currentChess(3) currentChess(4)];

            %left

            elseif clickPoint(1)-currentChess(1)>-100&&clickPoint(1)-currentChess(1)<0 ...

                && clickPoint(2)-currentChess(2)>0&&clickPoint(2)-currentChess(2)<200      Tcover1.2.3.3

                nextPosition=[currentChess(1)-100 currentChess(2) currentChess(3) currentChess(4)];

            %right

            elseif clickPoint(1)-currentChess(1)>200&&clickPoint(1)-currentChess(1)<300 ...

                && clickPoint(2)-currentChess(2)>0 && clickPoint(2)-currentChess(2)<200       Tcover1.2.3.4

                nextPosition=[currentChess(1)+100 currentChess(2) currentChess(3) currentChess(4)];

            else Tcover1.2.3.5

                nextPosition = [currentChess(1) currentChess(2) currentChess(3) currentChess(4)];

            end

        %1\*2

        elseif currentChess(3)==190 && currentChess(4)==90

            %up

            if clickPoint(1)-currentChess(1) >0 && clickPoint(1)-currentChess(1) <200 ...

                && clickPoint(2)-currentChess(2)>100 && clickPoint(2)-currentChess(2)<200      Tcover1.2.3.6

                nextPosition=[currentChess(1) currentChess(2)+100 currentChess(3) currentChess(4)];

            %down

            elseif clickPoint(1)-currentChess(1)>0 && clickPoint(1)-currentChess(1)<200 ...

                && clickPoint(2)-currentChess(2)<0 && clickPoint(2)-currentChess(2)>-100       Tcover1.2.3.7

                nextPosition=[currentChess(1) currentChess(2)-100 currentChess(3) currentChess(4)];

            %left

            elseif clickPoint(1)-currentChess(1)>-100&&clickPoint(1)-currentChess(1)<0 ...

                && clickPoint(2)-currentChess(2)>0&&clickPoint(2)-currentChess(2)<100      Tcover1.2.3.8

                nextPosition=[currentChess(1)-100 currentChess(2) currentChess(3) currentChess(4)];

            %right

            elseif clickPoint(1)-currentChess(1)>200&&clickPoint(1)-currentChess(1)<300 ...

                && clickPoint(2)-currentChess(2)>0 && clickPoint(2)-currentChess(2)<100       Tcover1.2.3.9

                nextPosition=[currentChess(1)+100 currentChess(2) currentChess(3) currentChess(4)];

            else Tcover1.2.3.10

                nextPosition = [currentChess(1) currentChess(2) currentChess(3) currentChess(4)];

            end

        %2\*1

        elseif currentChess(3)==90 && currentChess(4)==190

            %up

            if clickPoint(1)-currentChess(1) >0 && clickPoint(1)-currentChess(1) <200 ...

                && clickPoint(2)-currentChess(2)>200 && clickPoint(2)-currentChess(2)<300       Tcover1.2.3.11

                nextPosition=[currentChess(1) currentChess(2)+100 currentChess(3) currentChess(4)];

            %up

            elseif clickPoint(1)-currentChess(1)>0 && clickPoint(1)-currentChess(1)<100 ...

                && clickPoint(2)-currentChess(2)<0 && clickPoint(2)-currentChess(2)>-100       Tcover1.2.3.12

                nextPosition=[currentChess(1) currentChess(2)-100 currentChess(3) currentChess(4)];

            %up

            elseif clickPoint(1)-currentChess(1)>-100 && clickPoint(1)-currentChess(1)<0 ...

                && clickPoint(2)-currentChess(2)>0&&clickPoint(2)-currentChess(2)<200    Tcover1.2.3.13

                nextPosition=[currentChess(1)-100 currentChess(2) currentChess(3) currentChess(4)];

            %up

            elseif clickPoint(1)-currentChess(1)>100 && clickPoint(1)-currentChess(1)<200 ...

                && clickPoint(2)-currentChess(2)>0&&clickPoint(2)-currentChess(2)<200    Tcover1.2.3.14

                nextPosition=[currentChess(1)+100 currentChess(2) currentChess(3) currentChess(4)];

            else Tcover1.2.3.15

                nextPosition = [currentChess(1) currentChess(2) currentChess(3) currentChess(4)];

            end

        %1\*1

        elseif currentChess(3)==90 && currentChess(4)==90

            %up

            if clickPoint(1)-currentChess(1) >0 && clickPoint(1)-currentChess(1) <100 ...

                && clickPoint(2)-currentChess(2)>100 && clickPoint(2)-currentChess(2)<200       Tcover1.2.3.16

                nextPosition=[currentChess(1) currentChess(2)+100 currentChess(3) currentChess(4)];

            %down

            elseif clickPoint(1)-currentChess(1)>0 && clickPoint(1)-currentChess(1)<100 && ...

                clickPoint(2)-currentChess(2)<0 && clickPoint(2)-currentChess(2)>-100 Tcover1.2.3.17

                nextPosition=[currentChess(1) currentChess(2)-100 currentChess(3) currentChess(4)];

            %left

            elseif clickPoint(1)-currentChess(1)>-100&&clickPoint(1)-currentChess(1)<0 ...

                && clickPoint(2)-currentChess(2)>0&&clickPoint(2)-currentChess(2)<100      Tcover1.2.3.18

                nextPosition=[currentChess(1)-100 currentChess(2) currentChess(3) currentChess(4)];

            %right

            elseif clickPoint(1)-currentChess(1)>100&&clickPoint(1)-currentChess(1)<200 ...

                && clickPoint(2)-currentChess(2)>0 && clickPoint(2)-currentChess(2)<100       Tcover1.2.3.19

                nextPosition=[currentChess(1)+100 currentChess(2) currentChess(3) currentChess(4)];

            else Tcover1.2.3.20

                nextPosition = [currentChess(1) currentChess(2) currentChess(3) currentChess(4)];

            end

        end

    else Tcover1.2.3.21

        nextPosition = [currentChess(1) currentChess(2) currentChess(3) currentChess(4)];

    end

end

* Coverage Criteria: Statement coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T1.2.3.1 |
| Coverage Item | Tcover1.2.3.1 |
| Input | click\_point = [105, 355]; |
| State | currentChess = {[5 105 190 190]}; |
| Expected Output | od = [5 205 190 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.2 |
| Coverage Item | Tcover1.2.3.2 |
| Input | click\_point = [205, 255]; |
| State | currentChess = {[105 305 190 190]}; |
| Expected Output | od = [105 205 190 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.3 |
| Coverage Item | Tcover1.2.3.3 |
| Input | click\_point = [55, 355]; |
| State | currentChess = {[105 305 190 190]}; |
| Expected Output | od = [5 305 190 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.4 |
| Coverage Item | Tcover1.2.3.4 |
| Input | click\_point = [355, 355]; |
| State | currentChess = {[105 305 190 190]}; |
| Expected Output | od = [205 305 190 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.5 |
| Coverage Item | Tcover1.2.3.5 |
| Input | click\_point = [205, 380]; |
| State | currentChess = {[105 305 190 190]}; |
| Expected Output | od = [105 305 190 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.6 |
| Coverage Item | Tcover1.2.3.6 |
| Input | click\_point = [205, 355]; |
| State | currentChess = {[105 205 190 90]}; |
| Expected Output | od = [105 305 190 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.7 |
| Coverage Item | Tcover1.2.3.7 |
| Input | click\_point = [205, 155]; |
| State | currentChess = {[105 205 190 90]}; |
| Expected Output | od = [105 105 190 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.8 |
| Coverage Item | Tcover1.2.3.8 |
| Input | click\_point = [55, 255]; |
| State | currentChess = {[105 205 190 90]}; |
| Expected Output | od = [5 205 190 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.9 |
| Coverage Item | Tcover1.2.3.9 |
| Input | click\_point = [355, 255]; |
| State | currentChess = {[105 205 190 90]}; |
| Expected Output | od = [205 205 190 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.10 |
| Coverage Item | Tcover1.2.3.10 |
| Input | click\_point = [205, 255]; |
| State | currentChess = {[105 205 190 90]}; |
| Expected Output | od = [105 205 190 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.11 |
| Coverage Item | Tcover1.2.3.11 |
| Input | click\_point = [105, 355]; |
| State | currentChess = {[5 105 90 190]}; |
| Expected Output | od = [5 205 90 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.12 |
| Coverage Item | Tcover1.2.3.12 |
| Input | click\_point = [55, 55]; |
| State | currentChess = {[5 105 90 190]}; |
| Expected Output | od = [5 5 90 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.13 |
| Coverage Item | Tcover1.2.3.13 |
| Input | click\_point = [255, 205]; |
| State | currentChess = {[305 105 90 190]}; |
| Expected Output | od = [205 105 90 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.14 |
| Coverage Item | Tcover1.2.3.14 |
| Input | click\_point = [155, 205]; |
| State | currentChess = {[5 105 90 190]}; |
| Expected Output | od = [105 105 90 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.15 |
| Coverage Item | Tcover1.2.3.15 |
| Input | click\_point = [105, 205]; |
| State | currentChess = {[5 105 90 190]}; |
| Expected Output | od = [5 105 90 190]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.16 |
| Coverage Item | Tcover1.2.3.16 |
| Input | click\_point = [255, 255]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [205 205 90 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.17 |
| Coverage Item | Tcover1.2.3.17 |
| Input | click\_point = [255, 55]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [205 5 90 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.18 |
| Coverage Item | Tcover1.2.3.18 |
| Input | click\_point = [155, 155]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [105 105 90 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.19 |
| Coverage Item | Tcover1.2.3.19 |
| Input | click\_point = [355, 155]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [305 105 90 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.20 |
| Coverage Item | Tcover1.2.3.20 |
| Input | click\_point = [255, 155]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [205 105 90 90]; |

|  |  |
| --- | --- |
|  | Test Case T1.2.3.21 |
| Coverage Item | Tcover1.2.3.21 |
| Input | click\_point = [0, 0]; |
| State | currentChess = {[205 105 90 90]}; |
| Expected Output | od = [205 105 90 90]; |

* Test coverage: 21/21=100%
* Test result: 21 passed

### T1.2.4: Test judge ()

function judge(process)

    % judge whether the move is legal

    process.chessDB.position{process.chessDB.id}=process.chessDB.nextPosition;

    board = process.transMatrix(process.chessDB.position);

    if sum(board(:)==0) ~= 2  % the move is illegal Tcover1.2.4.1

        process.chessDB.position(process.chessDB.id)=process.chessDB.currentChess;

    else

        if isequal(board,process.chessDB.currentLocate) Tcover1.2.4.2

        else Tcover1.2.4.3

            process.chessDB.step = process.chessDB.step + 1;

            process.gameview.StepButton.Text=num2str(process.chessDB.step);

            switch process.chessDB.id

                case 1

                    process.gameview.Caocao.Position = process.chessDB.nextPosition;

                case 2

                    process.gameview.Zhangfei.Position = process.chessDB.nextPosition;

                case 3

                    process.gameview.Zhaoyun.Position = process.chessDB.nextPosition;

                case 4

                    process.gameview.Machao.Position = process.chessDB.nextPosition;

                case 5

                    process.gameview.Huangzhong.Position = process.chessDB.nextPosition;

                case 6

                    process.gameview.Guanyu.Position = process.chessDB.nextPosition;

                case 7

                    process.gameview.soldier1.Position = process.chessDB.nextPosition;

                case 8

                    process.gameview.soldier4.Position = process.chessDB.nextPosition;

                case 9

                    process.gameview.soldier2.Position = process.chessDB.nextPosition;

                case 10

                    process.gameview.soldier3.Position = process.chessDB.nextPosition;

            end

            if process.chessDB.nextPosition(3:4)==[190 190]

                if process.chessDB.nextPosition(1:2)==[105 5]

                    process.gameover\_view = gameover;

                end

            end

        end

    end

end

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T1.2.4.1 |
| Coverage Item | Tcover1.2.4.1 |
| Input | None |
| State | gp.chessDB.id = 2;  gp.chessDB.nextPosition = [105 305 190 190];  gp.chessDB.currentChess = {[5 305 90 190]};  gp.chessDB.position = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |
| Expected Output | gp.chessDB.position(gp.chessDB.id) = {[5 305 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T1.2.4.2 |
| Coverage Item | Tcover1.2.4.2 |
| Input | None |
| State | gp.chessDB.id = 2;  gp.chessDB.nextPosition = [5 305 90 190];  gp.chessDB.position = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |
| Expected Output | gp.chessDB.position(gp.chessDB.id) = {[5 305 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T1.2.4.3 |
| Coverage Item | Tcover1.2.4.3 |
| Input | None |
| State | gp.chessDB.id = 7;  gp.chessDB.step = 0;  gp.chessDB.nextPosition = [105 5 90 90];  gp.chessDB.position = {[105 305 190 190], [5 305 90 190], [305 305 90 190], [5 105 90 190], [305 105 90 190], [105 205 190 90], [5 5 90 90], [105 105 90 90], [205 105 90 90], [305 5 90 90]}; |
| Expected Output | gp.chessDB.position(gp.chessDB.id) = {[105 5 90 90]});  gp.chessDB.step = 1; |

* Test coverage: 3/3=100%
* Test result: 3 passed

# T2: Integration Test

## T2.1: GameProcess+StartDB Integration

### T2.1.1: Test getStartPosition () with transMatrix()

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T2.1.1.1 |
| Coverage Item | Tcover2.1.1.1 |
| Input | None |
| State | db.mode = 'hengdaolima'; |
| Expected Output | od = [2, 1, 1, 3; 2, 1, 1, 3; 4, 6, 6, 5; 4, 8, 9, 5; 7, 0, 0, 10]; |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.2 |
| Coverage Item | Tcover2.1.1.2 |
| Input | None |
| State | db.mode = 'qitoubingjin'; |
| Expected Output | od = [2, 1, 1, 3; 2, 1, 1, 3; 7, 8, 9, 10; 4, 6, 6, 5; 4, 0, 0, 5]; |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.3 |
| Coverage Item | Tcover2.1.1.3 |
| Input | None |
| State | db.mode = 'bingfensanlu'; |
| Expected Output | od = [7, 1, 1, 8; 2, 1, 1, 3; 2, 6, 6, 3; 4, 9, 10, 5; 4, 0, 0, 5]; |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.4 |
| Coverage Item | Tcover2.1.1.4 |
| Input | None |
| State | db.mode = 'weierbujian'; |
| Expected Output | od = [2, 1, 1, 10; 2, 1, 1, 9; 3, 6, 6, 8; 3, 4, 5, 7; 0, 4, 5, 0]; |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.5 |
| Coverage Item | Tcover2.1.1.5 |
| Input | None |
| State | db.mode = 'jiezuxiandeng'; |
| Expected Output | od = [7, 1, 1, 10; 8, 1, 1, 9; 0, 6, 6, 0; 2, 3, 4, 5; 2, 3, 4, 5]; |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.6 |
| Coverage Item | Tcover2.1.1.6 |
| Input | None |
| State | db.mode = 'test'; |
| Expected Output | od = [2, 3, 0, 4; 2, 3, 7, 4; 1, 1, 0, 5; 1, 1, 8, 5; 9, 10, 6, 6] |

|  |  |
| --- | --- |
|  | Test Case T2.1.1.7 |
| Coverage Item | Tcover2.1.1.7 |
| Input | None |
| State | db.mode = 'diy';  db.diyPosition = {[5 105 190 190], [5 305 90 190],[105 305 90 190], [305 305 90 190], [305 105 90 190], [205 5 190 90], [205 305 90 90], [205 105 90 90], [5 5 90 90], [105 5 90 90]}; |
| Expected Output | od = [2, 3, 0, 4; 2, 3, 7, 4; 1, 1, 0, 5; 1, 1, 8, 5; 9, 10, 6, 6]; |

* Test coverage: 7/7=100%
* Test result: 7 passed

### T2.1.2: Test getStartPosition () with getCurrentChess()

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T2.1.2.1 |
| Coverage Item | Tcover2.1.2.1 |
| Input | None |
| State | db.mode = 'hengdaolima';  id = 1; |
| Expected Output | od = {[105 305 190 190]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.2 |
| Coverage Item | Tcover2.1.2.2 |
| Input | None |
| State | db.mode = 'qitoubingjin';  id = 2; |
| Expected Output | od = {[5 305 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.3 |
| Coverage Item | Tcover2.1.2.3 |
| Input | None |
| State | db.mode = 'bingfensanlu';  id = 3; |
| Expected Output | od = {[305 205 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.4 |
| Coverage Item | Tcover2.1.2.4 |
| Input | None |
| State | db.mode = 'weierbujian';  id = 4; |
| Expected Output | od = {[105 5 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.5 |
| Coverage Item | Tcover2.1.2.5 |
| Input | None |
| State | db.mode = 'jiezuxiandeng';  id = 5; |
| Expected Output | od = {[305 5 90 190]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.6 |
| Coverage Item | Tcover2.1.2.6 |
| Input | None |
| State | db.mode = 'test';  id = 6; |
| Expected Output | od = {[205 5 190 90]}; |

|  |  |
| --- | --- |
|  | Test Case T2.1.2.7 |
| Coverage Item | Tcover2.1.2.7 |
| Input | None |
| State | db.mode = 'diy';  id = 7;  db.diyPosition = {[5 105 190 190], [5 305 90 190],[105 305 90 190], [305 305 90 190], [305 105 90 190], [205 5 190 90], [205 305 90 90], [205 105 90 90], [5 5 90 90], [105 5 90 90]}; |
| Expected Output | od = {[205 305 90 90]}; |

* Test coverage: 7/7=100%
* Test result: 7 passed

# T3: Functional Test

## T3.1: Use Case “Change Theme”

### T3.1.1: Test theme

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T3.1.1.1 |
| Coverage Item | Tcover3.1.1.1 |
| Input | testCase.press(theme\_window.theme2); |
| State | theme1 |
| Expected Output | theme2 |

|  |  |
| --- | --- |
|  | Test Case T3.1.1.2 |
| Coverage Item | Tcover3.1.1.2 |
| Input | testCase.press(theme\_window.theme1); |
| State | theme2 |
| Expected Output | theme1 |

* Test coverage: 2/2=100%
* Test result: 2 passed

## T3.2: Use Case “Change Mode”

T3.2.1: Test mode

* Coverage Criteria: Branch coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T3.2.1.1 |
| Coverage Item | Tcover3.2.1.1 |
| Input | testCase.press(mode\_window.hengdaolima); |
| State | startDB.mode ~= 'hengdaolima'; |
| Expected Output | startDB.mode = 'hengdaolima'; |

|  |  |
| --- | --- |
|  | Test Case T3.2.1.2 |
| Coverage Item | Tcover3.2.1.2 |
| Input | testCase.press(mode\_window.qitoubingjin); |
| State | startDB.mode ~= 'qitoubingjin'; |
| Expected Output | startDB.mode = 'qitoubingjin'; |

|  |  |
| --- | --- |
|  | Test Case T3.2.1.3 |
| Coverage Item | Tcover3.2.1.3 |
| Input | testCase.press(mode\_window.bingfensanlu); |
| State | startDB.mode ~= 'bingfensanlu'; |
| Expected Output | startDB.mode = 'bingfensanlu'; |

|  |  |
| --- | --- |
|  | Test Case T3.2.1.4 |
| Coverage Item | Tcover3.2.1.4 |
| Input | testCase.press(mode\_window.weierbujian); |
| State | startDB.mode ~= 'weierbujian'; |
| Expected Output | startDB.mode = 'weierbujian'; |

|  |  |
| --- | --- |
|  | Test Case T3.2.1.5 |
| Coverage Item | Tcover3.2.1.5 |
| Input | testCase.press(mode\_window.jiezuiandeng); |
| State | startDB.mode ~= 'jiezuxiandeng'; |
| Expected Output | startDB.mode = 'jiezuxiandeng'; |

* Test coverage: 5/5=100%
* Test result: 5 passed

## T3.3: Use Case “DIY Chesses”

T3.3.1: Test diy

* Coverage Criteria: Statement coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T3.3.1.1 |
| Coverage Item | Tcover3.3.1.1 |
| Input | presses to place the chesses |
| State | startDB.mode = 'diy'; |
| Expected Output | chesses placed correctly on GameView |

* Test coverage: 1/1=100%
* Test result: 1 passed

## T3.4: Use Case “Play Game”

T3.4.1: Test run

* Coverage Criteria: Statement coverage
* Test case

|  |  |
| --- | --- |
|  | Test Case T3.4.1.1 |
| Coverage Item | Tcover3.4.1.1 |
| Input | presses to move chesses |
| State | chesses haves been placed on the GameView |
| Expected Output | CaoCao moves to the exit and a gameover UI shows |

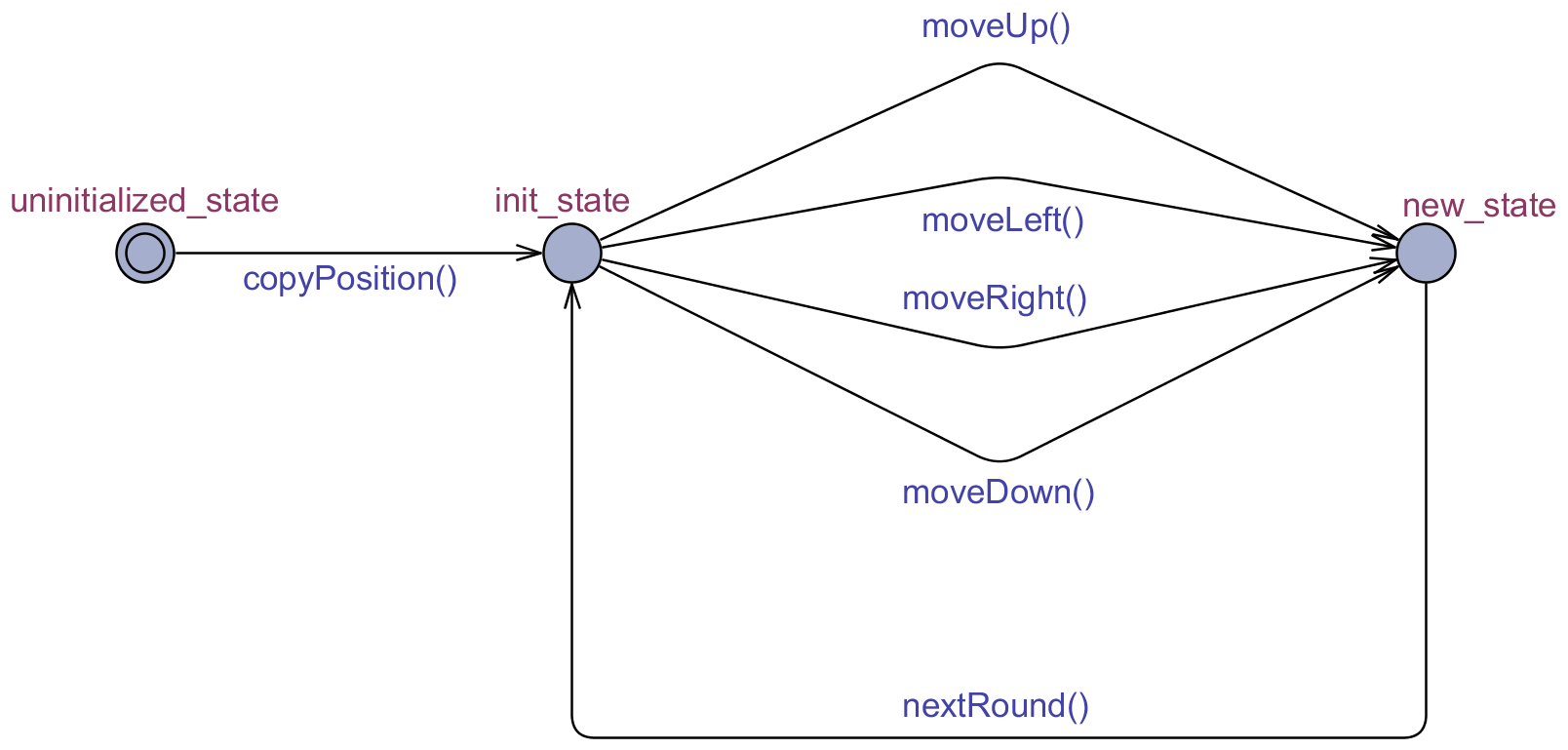
* Test coverage: 1/1=100%
* Test result: 1 passed

# T4: Model Checking

The figure below shows the UPPAAL model. The unitialized\_state is the state before giving information about the chessboard, the init\_state is the state before any movement of any chess, the new\_state is the state after a movement. The copyPosition() function initializes the board information, the four move functions try to move a chess and the nextRound() re-initializes the chessboard and prepares for next movement.

UPPAAL actually models the move() and judge() functions in Matlab – if it is legal to move the chess, then move the chess; if not legal, then keep the chess unmoved.

The position matrix inside UPPAAL model consists of ids from 0 to 10, so it can be verified by checking the number of ids or sum of entries inside the matrix.



## T4.1 No Overlapping Between Chesses

Since there should be only two entries are empty, meaning there should be only two zeros in the matrix, thus by checking the number of zeros we can check if there’s overlapping between chesses.

The UPPAAL query:

A[] (Process.new\_state imply Process.checkZero() == 2)

* Validation result: Pass

## T4.2 Chess Never Goes Out of The Chessboard

Since the ids of chesses don’t change, meaning the sum of ids should always be 78, thus by checking the sum of all ids we can check if any chess go out of the board.

The UPPAAL query:

A[] (Process.new\_state imply Process.checkIDSum() == 78)

* Validation result: Pass