```
1  import java.util.concurrent.ThreadLocalRandom;
2
3  public class Man {//Start of man class
4      protected int age;//Man's age
5      protected String[][] dna;//DNA grid
6      protected int healthyTotal = 0;//Count of total
   healthy cells
7
8      public Man(String[][] a, int b) {//Start of man
   constructor
9          this.dna = a;
10         this.age = b;
11     }//End of man constructor
12
13     public void youth() {//Youth cell injector
14         String[][] a = this.dna;
15         int counter = 0;
16         for (int j = 0; j < 5; j++) {
17             for (int i = 0; i < 5; i++) {
18                 if (a[j][i].equals("DM") || a[j][i].equals
   ("MW")) {//Check if unhealthy
19                     if (counter < 4) {//Cure if possible
20                         a[j][i] = "YS";
21                         counter++;
22                     }
23                 }
24             }
25         }
26         this.dna = a;
27     }//End of cell injector
28
29     public void youthFirst() {//Initial Youth cell
   injector
30         String[][] a = this.dna;
31         int counter = 0;
32         for (int j = 0; j < 5; j++) {
33             for (int i = 0; i < 5; i++) {
34                 if (a[j][i].equals("DM") || a[j][i].equals
   ("MW")) {//Check if unhealthy
35                     if (counter < 6) {//Cure if possible
36                         a[j][i] = "YS";
37                         counter++;
38                     }
39                 }
40             }
```

```
41          }
42          this.dna = a;
43      }//End of cell injector
44
45      public void spread() {//Start of spread
46          String[][] a = this.dna;
47          int ran = 0;
48          for (int j = 0; j < 5; j++) {
49              for (int i = 0; i < 5; i++) {
50                  if (a[j][i].equals(Main.dmd)) {
51                      ran = getRandomValue(0, 100);//Random
    chance
52                      if (j != 0 && ran <= 15) {//Above
53                          a[j - 1][i] = "DM";
54                      }
55                      ran = getRandomValue(0, 100);//Random
    chance
56                      if (j != 4 && ran <= 15) {//below
57                          a[j + 1][i] = "DM";
58                      }
59                      ran = getRandomValue(0, 100);//Random
    chance
60                      if (i != 0 && ran <= 35) {//Left
61                          a[j][i - 1] = "DM";
62                      }
63                      ran = getRandomValue(0, 100);//Random
    chance
64                      if (i != 4 && ran <= 35) {//Right
65                          a[j][i + 1] = "DM";
66                      }
67                  }
68              }
69          }
70          this.dna = a;
71      }//End of spread
72
73      public void infect() {//Start of infect
74          String[][] a = this.dna;
75          int ran = 0;
76          for (int j = 0; j < 5; j++) {
77              for (int i = 0; i < 5; i++) {
78                  ran = getRandomValue(0, 100);//Infection
    chance
79                  if (ran <= 5) {
80                      a[j][i] = "DM";
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81                      ran = getRandomValue(0, 100);//
   Direction of wilt
82                      if (ran <= 25 && j != 0 && a[j - 1][i
   ].equals("HM")) {
83                          a[j - 1][i] = "MW";
84                      } else if (ran > 25 && ran <= 50 && j
    != 4 && a[j + 1][i].equals("HM")) {
85                          a[j + 1][i] = "MW";
86                      } else if (ran > 50 && ran <= 75 && i
    != 0 && a[j][i - 1].equals("HM")) {
87                          a[j][i - 1] = "MW";
88                      } else if (ran > 75 && ran <= 100 &&
   i != 4 && a[j][i + 1].equals("HM")) {
89                          a[j][i + 1] = "MW";
90                      }
91                  }
92              }
93          }
94          this.dna = a;
95      }//End of infect
96
97      public void countHealthy() {//Start of counts healthy
    cells
98          for (int j = 0; j < 5; j++) {
99              for (int i = 0; i < 5; i++) {
100                 if (this.dna[j][i] == "HM") {
101                     this.healthyTotal++;
102                 }
103             }
104         }
105     }//End of countHealthy
106
107     public void cure() {//Start of cure
108         int ran = 0;
109         for (int j = 0; j < 5; j++) {
110             for (int i = 0; i < 5; i++) {
111                 if (this.dna[j][i] == "YS") {
112                     ran = getRandomValue(0, 100);//Chance
    of cure
113                     if (this.age >= 80) {//if man is over
    80
114                         if (j != 0 && (this.dna[j - 1][i]
   .equals("DM") || this.dna[j - 1][i].equals("MW") && ran >
    30)) {//near up
115                             this.dna[j - 1][i] = "HM";
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116                         }
117                         if ((j != 1 && j != 0) && (this.
    dna[j - 2][i].equals("DM") || this.dna[j - 2][i].equals("
    MW") && ran > 40)) {//far up
118                             this.dna[j - 2][i] = "HM";
119                         }
120                         if (j != 4 && (this.dna[j + 1][i]
    .equals("DM") || this.dna[j + 1][i].equals("MW") && ran >
     30)) {//near down
121                             this.dna[j + 1][i] = "HM";
122                         }
123                         if ((j != 4 && j != 3) && (this.
    dna[j + 2][i].equals("DM") || this.dna[j + 2][i].equals("
    MW") && ran > 40)) {//far down
124                             this.dna[j + 2][i] = "HM";
125                         }
126                         if (i != 0 && (this.dna[j][i - 1]
    .equals("DM") || this.dna[j][i - 1].equals("MW") && ran >
     30)) {//near left
127                             this.dna[j][i - 1] = "HM";
128                         }
129                         if ((i != 1 && i != 0) && (this.
    dna[j][i - 2].equals("DM") || this.dna[j][i - 2].equals("
    MW") && ran > 40)) {//far left
130                             this.dna[j][i - 2] = "HM";
131                         }
132                         if (i != 4 && (this.dna[j][i + 1]
    .equals("DM") || this.dna[j][i + 1].equals("MW") && ran >
     30)) {//near right
133                             this.dna[j][i + 1] = "HM";
134                         }
135                         if ((i != 4 && i != 3) && (this.
    dna[j][i + 2].equals("DM") || this.dna[j][i + 2].equals("
    MW") && ran > 40)) {//far right
136                             this.dna[j][i + 2] = "HM";
137                         }
138                     } else if (this.age >= 70) {//if is
    in seventies
139                         if (j != 0 && (this.dna[j - 1][i]
    .equals("DM") || this.dna[j - 1][i].equals("MW") && ran >
     25)) {
140                             this.dna[j - 1][i] = "HM";
141                         }
142                         if ((j != 1 && j != 0) && (this.
    dna[j - 2][i].equals("DM") || this.dna[j - 2][i].equals("
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142 MW") && ran > 30)) {
143                             this.dna[j - 2][i] = "HM";
144                         }
145                         if (j != 4 && (this.dna[j + 1][i]
    .equals("DM") || this.dna[j + 1][i].equals("MW") && ran >
     25)) {
146                             this.dna[j + 1][i] = "HM";
147                         }
148                         if ((j != 4 && j != 3) && (this.
    dna[j + 2][i].equals("DM") || this.dna[j + 2][i].equals("
    MW") && ran > 30)) {
149                             this.dna[j + 2][i] = "HM";
150                         }
151                         if (i != 0 && (this.dna[j][i - 1]
    .equals("DM") || this.dna[j][i - 1].equals("MW") && ran >
     25)) {
152                             this.dna[j][i - 1] = "HM";
153                         }
154                         if ((i != 1 && i != 0) && (this.
    dna[j][i - 2].equals("DM") || this.dna[j][i - 2].equals("
    MW") && ran > 30)) {
155                             this.dna[j][i - 2] = "HM";
156                         }
157                         if (i != 4 && (this.dna[j][i + 1]
    .equals("DM") || this.dna[j][i + 1].equals("MW") && ran >
     25)) {
158                             this.dna[j][i + 1] = "HM";
159                         }
160                         if ((i != 4 && i != 3) && (this.
    dna[j][i + 2].equals("DM") || this.dna[j][i + 2].equals("
    MW") && ran > 30)) {
161                             this.dna[j][i + 2] = "HM";
162                         }
163                     }
164                     else if(this.age >=60){//if in
    sixties
165                         if(j!=0 && (this.dna[j-1][i].
    equals("DM") || this.dna[j-1][i].equals("MW")&& ran >20))
    {
166                             this.dna[j-1][i]= "HM";
167                         }
168                         if((j!=1&&j!=0) && (this.dna[j-2]
    [i].equals("DM") || this.dna[j-2][i].equals("MW")&& ran >
    26)){
169                             this.dna[j-2][i]= "HM";
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170                         }
171                         if(j!=4 && (this.dna[j+1][i].
    equals("DM") || this.dna[j+1][i].equals("MW")&& ran >20))
    {
172                             this.dna[j+1][i]= "HM";
173                         }
174                         if((j!=4&&j!=3) && (this.dna[j+2]
    [i].equals("DM") || this.dna[j+2][i].equals("MW")&& ran >
    26)){
175                             this.dna[j+2][i]= "HM";
176                         }
177                         if(i!=0 && (this.dna[j][i-1].
    equals("DM") || this.dna[j][i-1].equals("MW")&& ran >20))
    {
178                             this.dna[j][i-1]= "HM";
179                         }
180                         if((i!=1&&i!=0) && (this.dna[j][i
    -2].equals("DM") || this.dna[j][i-2].equals("MW")&& ran >
    26)){
181                             this.dna[j][i-2]= "HM";
182                         }
183                         if(i!=4 && (this.dna[j][i+1].
    equals("DM") || this.dna[j][i+1].equals("MW")&& ran >20))
    {
184                             this.dna[j][i+1]= "HM";
185                         }
186                         if((i!=4&&i!=3) && (this.dna[j][i
    +2].equals("DM") || this.dna[j][i+2].equals("MW")&& ran >
    26)){
187                             this.dna[j][i+2]= "HM";
188                         }
189                     }
190                     else{//fifties
191                         if(j!=0 && (this.dna[j-1][i].
    equals("DM") || this.dna[j-1][i].equals("MW")&& ran >15))
    {
192                             this.dna[j-1][i]= "HM";
193                         }
194                         if((j!=1&&j!=0) && (this.dna[j-2]
    [i].equals("DM") || this.dna[j-2][i].equals("MW")&& ran >
    19)){
195                             this.dna[j-2][i]= "HM";
196                         }
197                         if(j!=4 && (this.dna[j+1][i].
    equals("DM") || this.dna[j+1][i].equals("MW")&& ran >15))
```

```
197 {
198                             this.dna[j+1][i]= "HM";
199                         }
200                         if((j!=4&&j!=3) && (this.dna[j+2]
    [i].equals("DM") || this.dna[j+2][i].equals("MW")&& ran >
    19)){
201                             this.dna[j+2][i]= "HM";
202                         }
203                         if(i!=0 && (this.dna[j][i-1].
    equals("DM") || this.dna[j][i-1].equals("MW")&& ran >15))
    {
204                             this.dna[j][i-1]= "HM";
205                         }
206                         if((i!=1&&i!=0) && (this.dna[j][i
    -2].equals("DM") || this.dna[j][i-2].equals("MW")&& ran >
    19)){
207                             this.dna[j][i-2]= "HM";
208                         }
209                         if(i!=4 && (this.dna[j][i+1].
    equals("DM") || this.dna[j][i+1].equals("MW")&& ran >15))
    {
210                             this.dna[j][i+1]= "HM";
211                         }
212                         if((i!=4&&i!=3) && (this.dna[j][i
    +2].equals("DM") || this.dna[j][i+2].equals("MW")&& ran >
    19)){
213                             this.dna[j][i+2]= "HM";
214                         }
215                     }
216                 }
217             }
218         }
219     }//End of cure
220
221     static int getRandomValue(int Min, int Max) {//Start
    of random value generator
222         return ThreadLocalRandom
223                 .current()
224                 .nextInt(Min, Max + 1);
225     }//End of random value generator
226 }//End of man class
227
```

```
1  import java.util.ArrayList;
2  import java.util.concurrent.ThreadLocalRandom;
3
4  public class Main {
5      public static String wilt = "MW";
6      public static String healthy = "HM";
7      public static String dmd = "DM";
8      public int year = 50;
9
10     public static void main(String[] args) {//Start of
   main
11         ArrayList<Man> men = new ArrayList<>(10);//Agents
12         //Fill list of agents
13         men.add(new Man(new String[5][5], 50));
14         men.add(new Man(new String[5][5], 61));
15         men.add(new Man(new String[5][5], 53));
16         men.add(new Man(new String[5][5], 60));
17         men.add(new Man(new String[5][5], 75));
18         men.add(new Man(new String[5][5], 90));
19         men.add(new Man(new String[5][5], 50));
20         men.add(new Man(new String[5][5], 52));
21         men.add(new Man(new String[5][5], 65));
22         men.add(new Man(new String[5][5], 50));
23         for (int i = 0; i < 10; i++) {//Loops agents
24             for (int j = 0; j < 10; j++) {//Loop year
25                 fill(men.get(i).dna);
26                 men.get(i).infect();
27                 men.get(i).spread();
28                 /*
29                 if (i == 0) {
30                     men.get(i).youthFirst();
31                 } else {
32                     men.get(i).youth();
33                 }
34                 men.get(i).cure();*/
35                 men.get(i).countHealthy();
36
37             }
38         }
39         for (int j = 0; j < men.size(); j++) {//Print each
    final agent
40             System.out.println("Person " + (j + 1) + "\n
   Age: " + men.get(j).age);
41             System.out.println("Average healthy cells: " +
    men.get(j).healthyTotal / 10);
```

```
42              printGrid(men.get(j).dna);
43          }
44      }//End of main
45
46      static String[][] fill(String[][] a) {//Start of fill
47          for (int j = 0; j < 5; j++) {
48              for (int i = 0; i < 5; i++) {
49                  a[j][i] = "HM";//Fill with cells
50              }
51          }
52          return a;
53      }
54
55      static void printGrid(String[][] a) {//Prints 2d array
56          for (int j = 0; j < 5; j++) {
57              for (int i = 0; i < 5; i++) {
58                  System.out.print(a[j][i] + " ");
59              }
60              System.out.print("\n");
61          }
62      }
63
64
65  }
66
```