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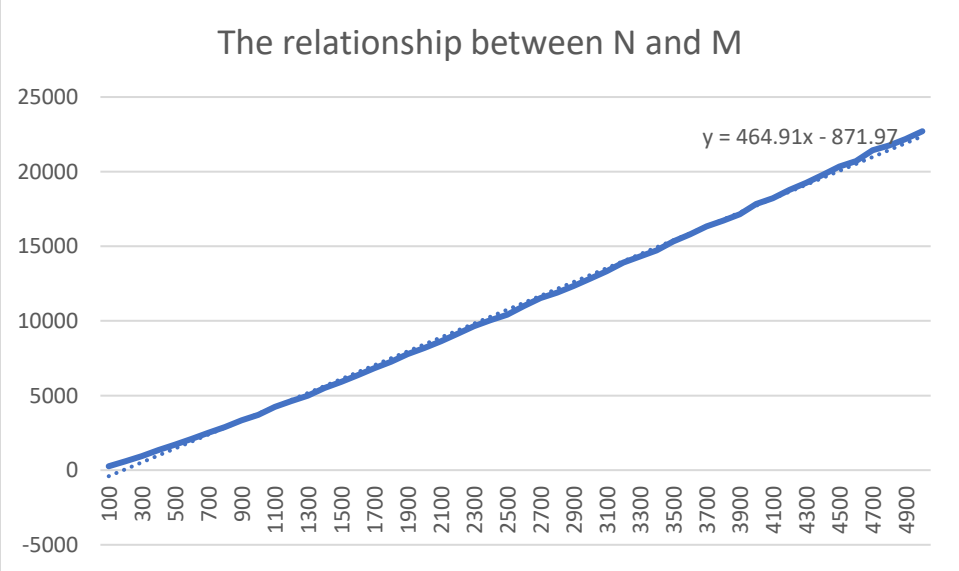
INFO 6205

Program Structures & Algorithms

Fall 2020

Assignment No.3

- **Task:** Quick Union with Path Compression
- **Output:** For N number of operations, the maximum number of P times to access the array is **C= N+ M*lg*N**, where C is a constant, and lg* is the number of iterations required for lg operation from n to 1.
- **Relationship conclusion**
  In theory, the relationship between N and m of WQUPC is not linear, but in practice, the relationship between N and m of WQUPC is approximately linear. Their theoretical relationship is **C= N+ M*lg*N.**
- **Evidence to support relationship**



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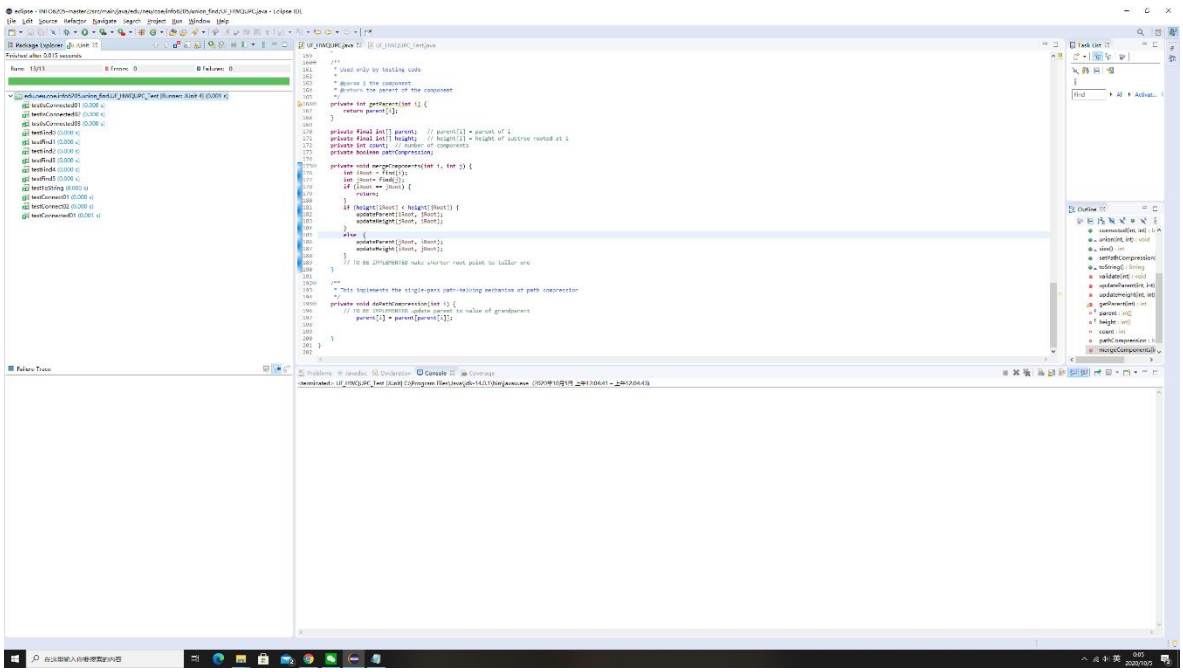
- **Screenshot of Unit test passing**

The test was successful



Count function and main function

```
            parent[i] = parent[parent[i]];
199
200
201     }
202     public static int count(int n) {
203         UF_HWQUPC cal = new UF_HWQUPC(n);
204         int conNumber =0;
205         Random ran= new Random();
206         while(cal.count != 1) {
207             int p=ran.nextInt(n);
208             int q=ran.nextInt(n);
209             if(! cal.connected(p,q)) {
210                 cal.union(p, q);
211             }
212             conNumber++;
213         }
214         return conNumber;
215     }
216     public static void main(String[] args) {
217         int n=100;
218         int sum =0;
219         for(int i=0; i<50; i++) {
220             for(int j=0; j<1000; j++){
221             sum +=count(n);
222             }
223             sum =sum/1000;
224             //System.out.println(sum+ " "+ n);
225             System.out.println(sum);
226             n+=100;
227
228         }
229     }
230 }
231
```