**Assignment Kit #12**

**Assignment description**

For the assignment, determine the value of A/FR for all the programs you have written this semester. Also find the number of test defects/KLOC for each of these programs and show the A/FR and test defects/KLOC on a plot like that shown in Figure 19.1 in the textbook. Also read Chapter 20 in the textbook.

For all the next programs you write for the rest of the semester, use the PSP and submit copies of the Code Review Checklists, Defect Recording Logs, and Project Plan Summaries for each program, as well as copies of Time Recording Log pages and Weekly Activity Summaries that you have not previously submitted.

**Comments on the assignment**

Your objective is to achieve as near to a 100 percent process yield as possible. When you do not, the degree to which you tried to achieve this goal will be measured by the value of AF/R. AF/R values of 2.0 or more are considered good.

**An example of a completed assignment**

**AF/R and Defects/KLOC Calculations**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Program** | **Development Minutes** | | | **A/FR** | **LOC** | **Test** | **Test** |
| **Number** | **Code Review** | **Compile** | **Test** |  |  | **Defects** | **Defects/KLOC** |
| **10** | 0 | 21 | 73 | 0 | 57 | 2 | 35.1 |
| **11** | 36 | 7 | 38 | 0.80 | 48 | 1 | 20.8 |
| **12** | 38 | 11 | 29 | 0.95 | 58 | 2 | 34.5 |
| **13** | 37 | 4 | 8 | 3.08 | 47 | 0 | 0 |
| **14** | 34 | 8 | 39 | 0.72 | 77 | 1 | 13.0 |
| **15** | 29 | 5 | 10 | 1.93 | 57 | 0 | 0 |

**Keep copies of all the forms and data you submit.**

**Table 19.1 PSP Project Plan Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| Student |  | Date |  |
| Program |  | Program # |  |
| Instructor |  | Language |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Summary** | | | **Plan** | | | |  | **Actual** | | |  | **To Date** | | |
| Minutes/LOC | | |  | | | |  |  | | |  |  | | |
| LOC/Hour | | |  | | | |  |  | | |  |  | | |
| Defects/KLOC | | |  | | | |  |  | | |  |  | | |
| Yield | | |  | | | |  |  | | |  |  | | |
| ***A/FR*** | | |  | | | |  |  | | |  |  | | |
| **Program Size (LOC):** | | |  | | | |  |  | | |  |  | | |
| Total New & Changed | | |  | | | |  |  | | |  |  | | |
| Maximum Size | | |  | | | |  |  | | |  |  | | |
| Minimum Size | | |  | | | |  |  | | |  |  | | |
| **Time in Phase (min.)** | | | **Plan** | |  | **Actual** | | |  | **To Date** | | |  | **To Date %** |
| Planning | | |  | |  |  | | |  |  | | |  |  |
| Design | | |  | |  |  | | |  |  | | |  |  |
| Code | | |  | |  |  | | |  |  | | |  |  |
| Code Review | | |  | |  |  | | |  |  | | |  |  |
| Compile | | |  | |  |  | | |  |  | | |  |  |
| Test | | |  | |  |  | | |  |  | | |  |  |
| Postmortem | | |  | |  |  | | |  |  | | |  |  |
| Total | | |  | |  |  | | |  |  | | |  |  |
| Maximum Time | | |  | |  |  | | |  |  | | |  |  |
| Minimum Time | | |  | |  |  | | |  |  | | |  |  |
| **Defects Injected** | ***Plan*** |  | | **Actual** |  | **To Date** | | |  | **To Date %** | | |  | **Def./hour** |
| Planning |  |  | |  |  |  | | |  |  | | |  |  |
| Design |  |  | |  |  |  | | |  |  | | |  |  |
| Code |  |  | |  |  |  | | |  |  | | |  |  |
| Code Review |  |  | |  |  |  | | |  |  | | |  |  |
| Compile |  |  | |  |  |  | | |  |  | | |  |  |
| Test |  |  | |  |  |  | | |  |  | | |  |  |
| Total |  |  | |  |  |  | | |  |  | | |  |  |
| **Defects Removed** | ***Plan*** |  | | **Actual** |  | **To Date** | | |  | **To Date %** | | |  | **Def./hour** |
| Planning |  |  | |  |  |  | | |  |  | | |  |  |
| Design |  |  | |  |  |  | | |  |  | | |  |  |
| Code |  |  | |  |  |  | | |  |  | | |  |  |
| Code Review |  |  | |  |  |  | | |  |  | | |  |  |
| Compile |  |  | |  |  |  | | |  |  | | |  |  |
| Test |  |  | |  |  |  | | |  |  | | |  |  |
| Total |  |  | |  |  |  | | |  |  | | |  |  |

**Table 19.2 PSP Project Plan Summary Instructions**

|  |  |
| --- | --- |
| Purpose | This form holds the estimated and actual project data in a convenient and readily retrievable form. |
| Header | Enter the following:  - your name and today's date  - the program name and number  - the instructor's name  - the language you will use to write the program |
| Minutes/LOC | Prior to development  - enter the Minutes/LOC planned for this project. Use the To Date rate from the most recent previous program.  After development  - Divide the total development time by the actual program size to get the actual and To Date Minutes/LOC.  - For example, if the project took 137 minutes and you produced 29 LOC, the Minutes/LOC would be 196/29 = 6.76. |
| LOC/Hour | Prior to development  - calculate the LOC per hour planned for this program by dividing 60 by the Plan Minutes/LOC.  After development  - For Actual and To Date LOC/Hour, divide 60 by the Actual and To Date Minutes/LOC.  - For Actual Minutes/LOC of 4.89, Actual LOC/Hour are 60/6.76 = 8.88. |
| Defects/KLOC | Prior to development  - Find the defects/KLOC To Date on the most recent previous program.  - Use this as the Plan Defects/KLOC for this project.  After development  - Calculate the defects/KLOC actual and To Date for this program.  - For Actual, multiply the total actual defects by 1000 and divide by the Actual Total New & Changed LOC.  - Make a similar calculation for To Date.  - With 17 defects to date and 153 Total New & Changed LOC, defects/KLOC To Date = 1000\*17/153=111.11. |
| Yield | - Calculate the plan, actual, and to date yield.  - Yield = 100\*(defects removed before compile)/(defects injected before compile), so with 5 injected and 4 found, yield = 100\*4/5=80.0%. |
| ***A/FR*** | ***Calculate the plan, actual, and To Date A/FR***  ***- For actual, for example, take the ratio of the actual code review time and divide by the sum of the actual compile and test times.***  ***- For review time of 29 minutes, compile time of 5 minutes, and test time of 10 minutes, A/FR = 29/(5+10) = 1.93.*** |
| Program Size (LOC) | Prior to development, enter under plan:  - the estimated Total, Maximum, and Minimum New & Changed LOC.  After Development:  - Count and enter the Actual New & Changed LOC.  - For To Date, add Actual New & Changed LOC to To Date New & Changed LOC for the previous program. |

**Table 19.2 (Continued)**

|  |  |
| --- | --- |
| Time in Phase - Plan | - For total development time, multiply Total New and Changed LOC by Minutes/LOC.  - For Maximum time, multiply the Maximum size by Minutes/LOC.  - For Minimum time, multiply the Minimum size by Minutes/LOC.  - From the Project Plan Summary for the most recent program, find the To Date % values for each phase.  - Using the To Date % from the previous program, calculate the plan time for each phase. |
| Time in Phase - Actual | - At job completion, enter the actual time in minutes spent in each development phase.  - Get these data from the time log. |
| Time in Phase - To Date | - For each phase, enter the sum of actual time and To Date time from the most recent previous program. |
| Time in Phase - To Date % | - For each phase, enter 100 times the To Date time for that phase divided by the Total To Date time. |
| Defects Injected -  Plan | - Before development, estimate the total number of defects to be injected in the program.  - The value is Plan Defects/KLOC times the Plan Total New & Changed LOC for this program divided by 1000.  - For example, with a Plan Defects/KLOC of 75.9 and a Plan New & Changed LOC of 75, Plan Total defects =75.9\*75/1000=5.69, so use 6.  - Before development, estimate the defects injected by phase using the estimate total defects and the To Date % defect injected distribution from the previous program. |
| Defects Injected -  Actual | - After development, find and enter the actual number of defects injected in each phase. |
| Defects Injected - To Date | - For each phase, enter the sum of the actual defects and the To Date defects from the most recent program. |
| Defects Injected - To Date % | - For each phase, enter 100 times the To Date defects for that phase divided by the total To Date defects. |
| Defects Injected - Defects/hour | - Calculate the defects injected per hour for design and code.  - For design, for example, multiply 60 times the design defects To Date and divide by the design time To Date = 60\*5/195 = 1.54 defects/hour. |
| Defects Removed - Plan | - In the total row, enter the estimated total defects.  - Using the To Date % values from the most recent program, calculate the plan defects removed for each phase. |
| Defects Removed - Actual | - After development, find and enter the actual number of defects removed in each phase. |
| Defects Removed - To Date | - For each phase, enter the sum of the actual defects and the To Date defects from the most recent program. |
| Defects Removed - To Date % | - For each phase, enter 100 times the To Date defects for that phase divided by the total To Date defects. |
| Defects Removed - Defects/hour | - Calculate the defects removed per hour for code review, compile, and test.  - For test, for example, multiply 60 times the test defects To Date and divide by the test time To Date = 60\*6/279 = 1.29 defects/hour. |