Lab-4: Specifying Tools and Technology

Group number: 20

Project Topic: A platform for creating and managing online crosswords.

Tools: Pycharm, VS code, MongoDB compass, Github copilot

Technologies and Frameworks: Django, pymongo, React JS

Justification:

Django is a particular high-level python web framework that enables rapid development and clean, pragmatic design. It provides an extensive set of built-in features and tools that make it easy to build complex web applications quickly. Django is perfect for building a crossword creating web application because it provides a robust admin interface, making it easy to manage the site's content, users and other important data.

Pymongo is the official python driver for MongoDB that allows developers to interact with the MongoDB database from within a python application. With Pymongo we can easily query,insert,delete and update the data in the MongoDB database. Pymongo also provides a range of features like indexing, aggregation and map-reduce which can be used to improve performance and scalability of the database.

React JS is an open-source Javascript framework that is used to create web applications and develop User Interfaces that increase the speed of the application. React JS is particularly useful as it makes making dynamic web applications with HTML strings much easier using JSX(JavaScript Extension). This project requires a highly interactive interface to create and solve crosswords making React JS perfect for the front end.

Database: MongoDB

Justification:

MongoDB is a NoSQL database that is particularly well-suited for handling large amounts of unstructured data or semi-structured data, it is particularly useful for a crossword website because it allows flexible schema-less data storage. This means that the developer can easily store and retrieve data related to crossword puzzles, including clues, answers, and user process.

Use Case Size Point:

Use Case	Number of transactions	Use-Case Complexity
Create Crossword	12	Complex
Solve Crossword	10	Complex
Login	7	Average
Subscribe	3	Simple
Rate a Crossword	7	Average
Add or remove crossword or member	8	Complex
Send Notifications	6	Average
View solution	6	Average
Sorting and Filtering Crossword list	7	Average
Access hints	3	Simple

Actor	Actor Type
User	Complex
Subscriber	Complex
Crossword Creator	Complex
Admin	Complex

Unadjusted Use-Case Points

Unadjusted Use-Case Weight (UUCW)

Use-Case Complexity	Use-Case Weight	Number of Use-Cases	Product
Simple	5	2	10
Average	10	5	50
Complex	15	3	45

UUCW = 5 × NSUC + 10 × NAUC + 15 × NCUC
= 10 + 50 + 45
= 105

Unadjusted Actor Weight (UAW):

Actor Complexity	Actor Weight	Number of Actors	Product
Simple	1	0	0
Average	2	0	0
Complex	3	4	12

UAW = 1 × NSA + 2 × NAA + 3 × NCA
= 0 + 0 + 4 x 3
= 12

Unadjusted Use-Case Points (UUCP)

UUCP = UUCW + UAW
= 105 + 12
= 117

Technical Complexity Factor (TCF)

Factor	Description	Weight (W)	Rated Value (0 to 5) (RV)	Impact (I = W × RV)
T1	Distributed System	2.0	4	8.0
T2	Response time or throughput performance objectives	1.0	2	2.0
T3	End user efficiency	1.0	5	5.0
T4	Complex internal processing	1.0	3	3.0
T5	Code must be reusable	1.0	4	4.0
T6	Easy to install	0.5	0	0.0
T7	Easy to use	0.5	5	2.5
T8	Portable	2.0	0	0.0
T9	Easy to change	1.0	2	2.0
T10	Concurrent	1.0	4	4.0
T11	Includes special security objectives	1.0	3	3.0
T12	Provides direct access for third parties	1.0	0	0.0
T13	Special user training facilities are required	1.0	3	3.0
			Total (TF)	36.5

TCF = 0.6 + (TF/100)

= 0.6 + 0.365

= 0.965

Environmental Complexity Factor (ECF)

Factor	Description	Weight (W)	Rated Value (0 to 5) (RV)	Impact (I = W × RV)
E1	Familiar with the development process	1.5	3	4.5
E2	Application experience	0.5	3	1.5
E3	Object-oriented experience	1.0	3	3.0
E4	Lead analyst capability	0.5	4	2.0
E5	Motivation	1.0	4	4.0
E6	Stable requirements	2.0	3	6.0
E7	Part-time staff	-1.0	2	-2.0
E8	Difficult programming language	-1.0	4	-4.0
			Total (EFactor)	15

EF = 1.4 + (- 0.03 * EFactor)

= 1.4 + (-0.45)

= 0.95

Factor	Description	Weight
UUCW	Unadjusted Use Case Weight	105
UAW	Unadjusted Actor Weight	12
TCF	Technical Complexity Factor	0.965
EF	Environmental Factor	0.95

UCP (Use Case Points) :

UCP are the adjusted use case points.

UCP = (UUCW + UAW) x TCF x ECF
= (105 + 12) * (0.965) * (0.95)
= 107.26

The **Productivity Factor (PF)** is a ratio of the number of man hours per use case point based on past projects.

In this project, assuming Productivity factor(PF) as 20.

Estimated Effort = UCP x Hours
= 107.26 x 20
= 2145 hours or approximately 90 days

Reference:

https://www.cs.cmu.edu/~jhm/DMS%202011/Presentations/Cohn%20-%20Estimating%20with%20Use%20Case%20Points_v2.pdf