

Application of Extreme Programming in Population Administration Service Applications and Village Licensing Management

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Abstract: Extreme Programming (XP) is a simple software development method. The main goal of the extreme programming method is to reduce the cost of software changes, in the previous system development methodologies. Population administration and licensing functions to fulfill the needs of the community in the need for structuring and publishing population documents and data. The purpose of this research is to apply the extreme programming software development method in the application of population administration services and village permits. The stages in the application of extreme programming that are carried out are first planning, namely planning user stories, values or application needs assessments, determining application function criteria or acceptance test criteria, and iteration planning. The second stage is the design, which consists of two parts, namely simple design and spike solution. The third stage is coding which consists of refactoring and pair programming. And the last step in applying the extreme programming method is testing which is done using the black box testing method with Equivalence Partitioning. Then carry out the realization of software development. The result of this study is that the extreme programming method can be applied well to the application of population administration services and village licensing arrangements and produces applications that suit the needs.

1 INTRODUCTION

Public services are very important in meeting the needs of the community, and this public service is one of the efforts made by the government to assist the community in achieving their goals and needs. Population Administration and licensing administration services are a form of public service implementation. Population administration and licensing functions to fulfill the needs of the community in the need for structuring and publishing population documents and data. Several population administration services and licensing arrangements are submitted by the community through the village government.

Web-based applications and information systems for public services such as population administration services (Sibarani, et al, 2015), village administration services, (Rahmadani, et al, 2019), information systems for correspondence services (Syaebani, et al, 2021), to self-service at the Village Office (Kurniati, et al, 2018) can assist the community in submitting the management of population administration and can

improve public services to the community at the village government level.

In the design, manufacture, and development of web-based applications and information systems, there are several methods that can be used, one of which is the *extreme programming method*. *Extreme Programming (XP)* is a simple software development method and is one of the *agile methods* pioneered by Kent Beck, Ron Jeffries, and Ward Cunningham. The main purpose of the *XP method* is to reduce the cost of software changes, in the previous system development methodology, the specified system requirements were at the first stage of project development and did not change (Ependi and Qoriani, 2014).

Several applications and development of information systems that apply *extreme programming methods* such as application to the development of public service management information systems (Nurkholis, et al., 2021), application to syar'iah dating bureau applications based on android mobile (Yahya, et al., 2019), application to application of livestock investment (Borman, dkk, 2020) and application to the design of public service information systems (Septiani and Habibi, 2022), show that the application

of the *XP development method* has worked well and is able to produce applications and information systems that meet the needs

2 LITERATURE REVIEW

2.1 Definition of Extreme Programming

Extreme programming is one of the methodologies of the agile software development approach that focuses on coding as the main activity at all stages of the development cycle that is more responsive to customer needs and builds software with better quality.

Extreme Programming is an approach or software development model that tries to simplify the various stages in the development process so that it becomes more adaptive and flexible (Pratama, 2017).

So it can be said that XP is a lightweight software development method and implements agile which tends to use an object-oriented approach and prioritizes a development process that is more responsive to user needs.

2.2 Extreme Programming Stage

There are four frameworks of activities in the stages of extreme programming implementation. The four activity frameworks from the extreme programming stages are as follows.

2.2.1 Planning

Planning or planning activities begin by collecting various requirements from the device to be developed. This is done so that team members understand the business context of the software and to get a general view of the main outputs and functions of the software. This will lead to the user's need to describe the output, features, and functions of the application to be developed.

2.2.2 Design

The design process in the XP methodology follows the KIS principle (keep it simple). Simple designs are always preferred over complex designs. Various additional function designs that are not needed but the developer feels that they will be requested by the user should not be made. This is because XP employs the use of class responsibility cards (CRC) as an effective mechanism for thinking about software in an object-oriented context. CRC will identify and organize

object-oriented classes that are appropriate for software upgrades. This means that various additional feature designs are developed when they are needed (when requested).

2.2.3 Coding

Once the user stories and initial framework design are complete, the XP team will not immediately proceed to the coding stage, but rather develop a series of unit tests that will be run on each story that will be created. XP recommends the concept of Pair Programming or paired programming, where two people work together to write code or program for a story. This provides greater opportunities for faster problem solving due to the collaboration of two programmers writing the same code.

2.2.4 Testing

After the coding stage is complete, the system testing stage is carried out to find out various errors that arise when the application is running and to ensure whether the software built is in accordance with the story of user needs.

3 RESEARCH METHODS

The schematic framework of the Extreme Programming method is shown in the figure 1 next:

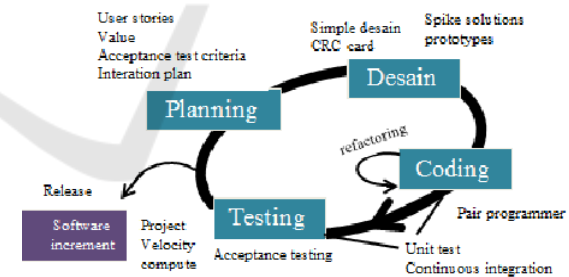


Figure 1: XP method framework schematic (Supriyatna, et al, 2018).

4 RESULTS

4.1 Planning

The steps involved in the planning are as follows:

4.1.1 User Stories

The following are user stories of the village administration service application which are defined as a table.

Table 1: User Stories.

User Role	Destination	Expected results
Public	I want to choose a service category	As a result, I can choose a service category
Public	I want to fill in the administrative file application form	As a result, I was able to fill out the administrative file submission form
Public	I want to upload the administrative requirements file	As a result, I can upload the administrative requirements file
Public	I want to see the status of administrative files	As a result, I can see the status of administrative files
Public	I want to download the authorized administration file	As a result, I can download the administrative files that have been authorized
Village Apparatus	I want to login	A result I can log in
Village Apparatus	I want to manage service categories	As a result, I can manage service categories
Village Apparatus	I want to see the administrative file application form data	As a result, I can see the administrative file application from data
Village Apparatus	I want to download the administrative requirements file	As a result, I can download the administrative requirements file
Village Apparatus	I want to manage administrative files	As a result, I can manage administrative files
Village Apparatus	I want to manage the status of administrative files	As a result, I can manage the status of administrative files
Village Apparatus	I want to manage monthly reports	As a result, I can manage monthly reports
Village Apparatus	I want to logout	As a result, I can log out
Village head	I want to login	A result, I can log in
Village head	I want to see the administrative files	As a result, I can see the administrative files
Village head	I'm looking at the status of the administrative file	As a result, I can see the status of administrative files
Village head	I want to see the monthly report	As a result, I can see the monthly report
Village head	I want to logout	As a result, I can log out

4.1.2 Values

Values or needs assessment in the application of village administration services based on user stories is as follows.

Table 2: Values.

No	User Stories	Value
1.	The public can choose the service category	2
2.	The public can fill out the administrative file submission form	5
3.	The public can upload the administrative requirements file	4
4.	The public can see the status of administrative files	4
5.	The public can download the approved administrative files	3
6.	Village devices can log in	2
7.	Village officials can manage service categories	3
8.	Village officials can view data on the administrative file submission form	3
9.	Village officials can download administrative requirements files	3
10.	Village officials can manage administrative files	4
11.	Village officials can manage the status of administrative files	5
12.	Village officials can manage monthly reports	3
13.	Village officials can log out	1
14.	The Village head can log in	1
15.	The village head can see the administrative files	2
16.	The village head can see the status of the administrative files	3
17.	The village head can see the monthly report	1
18.	The village head can log out	1

After determining the values, the next thing to do is sort the values from the largest to the smallest.

Table 3: Values after sorting.

No	User Stories	Value
1.	The public can fill out the administrative file submission form	5
2.	Village officials can manage the status of administrative files	5
3.	The public can upload the administrative requirements file	4
4.	The public can see the status of administrative files	4
5.	Village officials can manage administrative files	4
6.	The public can download the approved administrative files	3
7.	Village officials can manage service categories	3
8.	Village officials can view data on the administrative file submission form	3
9.	Village officials can download administrative requirements files	3
10.	Village officials can manage monthly reports	3
11.	The village head can see the status of the administrative files	3
12.	The public can choose the service category	2
13.	Village devices can log in	2
14.	The village head can see the administrative files	2
15.	Village officials can log out	1
16.	The Village head can log in	1
17.	The village head can see the monthly report	1
18.	The village head can log out	1

4.1.3 Acceptance Test Criteria

Acceptance test criteria are the stage of determining application function criteria to run according to user wishes based on user stories.. The following is a table of acceptance test criteria for the application of village administration services.

Table 4: Acceptance test criteria.

No	User Stories	Acceptance test criteria
1.	The public can choose the service category	A page display appears according to the selected category
2.	The public can fill out the administrative file submission form	The administrative file submission form appears Form data has been successfully entered
3.	The public can upload the administrative requirements file	The display for uploading the administrative requirements file appears A notification appears that the required file has been uploaded successfully
4.	The public can see the status of administrative files	The administrative file status display appears
5.	The public can download the approved administrative files	The administrative file download screen appears Administration file downloaded successfully
6.	Village devices can log in	Village officials can enter their username and password Successfully logged in and entered the village device page
7.	Village officials can manage service categories	Village officials can add, edit, and delete service categories
8.	Village officials can view data on the administrative file submission form	The data display of the administrative file submission form appears
9.	Village officials can download administrative requirements files	The administrative requirements file download screen appears File downloaded successfully
10.	Village officials can manage administrative files	Village officials can add, edit, and delete administrative files
11.	Village officials can manage the status of administrative files	Village officials can add, edit, and delete administrative file status
12.	Village officials can manage monthly reports	Village officials can add, edit, and delete monthly reports
13.	Village officials can log out	Village officials can exit the village apparatus page Go to the app home page
14.	The Village head can log in	The village head can enter a username and password Successfully logged in and entered the village head page
15.	The village head can see the administrative files	The administrative file data display appears

16.	The village head can see the status of the administrative files	The administrative file status display appears
17.	The village head can see the monthly report	The Monthly report display appears
18.	The village head can log out	The village head can get out of the village head's yard Go to the app home page

4.1.4 Iteration Plan

Iteration plan or iteration planning is a stage that aims to determine the order in which user stories will be worked on. There are several user stories that will be done in one iteration, this is called velocity which is a value to determine the length of the iteration process. The iteration plan for the village administration service application is as follows.

Table 5: Iteration plan.

No	User Stories	Value
1 iteration		
1.	The public can choose the service category	2
2.	The public can fill out the administrative file submission form	5
3.	Village devices can log in	2
4.	Village officials can log out	1
<i>Velocity</i>		10
Iteration 2		
5.	The public can upload the administrative requirements file	4
6.	Village officials can view data on the administrative file submission form	3
7.	Village officials can download administrative requirements files	3
<i>Velocity</i>		10
Iteration 3		
8.	Village officials can manage service categories	3
9.	Village officials can manage administrative files	4
10.	The public can download the approved administrative files	3
<i>Velocity</i>		10
Iteration 4		
11.	Village officials can manage the status of administrative files	5
12.	The public can see the status of administrative files	4
13.	The Village head can log in	1
<i>Velocity</i>		10
Iteration 5		
14.	Village officials can manage monthly reports	3
15.	The village head can see the status of the administrative files	3
16.	The village head can see the administrative files	2
17.	The village head can see the monthly report	1
18.	The village head can log out	1
<i>Velocity</i>		10

4.2 Design

The design stage consists of two parts, namely:

4.2.1 Simple Design

The application design stage is done using CRC (Class Responsibility Collaborator) and one of the UML diagrams is a use case diagram. The design of the administrative service application CRC is as follows.

Table 6: CRC (Class Responsibility Collaborator).

CategoriesService	
Responsibilities	Collaborator
id_category	Report
name_category	Administration Letter
Administration Letter	
Responsibilities	Collaborator
id_letter	CategoriesService
name_letter	FileRequirements
category	
FileRequirements	
Responsibilities	Collaborator
id_fileRequirements	Administration Letter
filenameRequirements	
letter	
file fileRequirements	
Submission Form	
Responsibilities	Collaborator
id_form	StatusFile
file_name	FileAdministration
name_applicant	
date	
status	
FileAdministration	
Responsibilities	Collaborator
id_Administration file	Report
id_form	Submission Form
filenameAdministration	
File_Administration	
Report	
Responsibilities	Collaborator
id_report	CategoriesService
month year	FileAdministration
population	
permission	
total	
StatusFile	
Responsibilities	Collaborator
id_status	Submission Form
name_status	

User	Collaborator
id_user	
user_name	
username	
password	
user_category	

Use case diagram depicts the interaction between the application user and the application being developed. The use case diagram of the village administration service application is as follows.

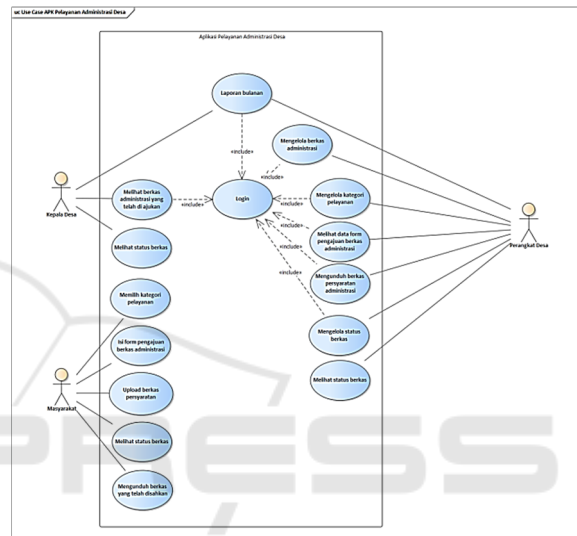


Figure 2: Use Case Diagram.

4.2.2 Spike Solution

At this stage, the design is made using an application prototype. The following is a prototype of the village administration service application. The tool used is the Pigma application.

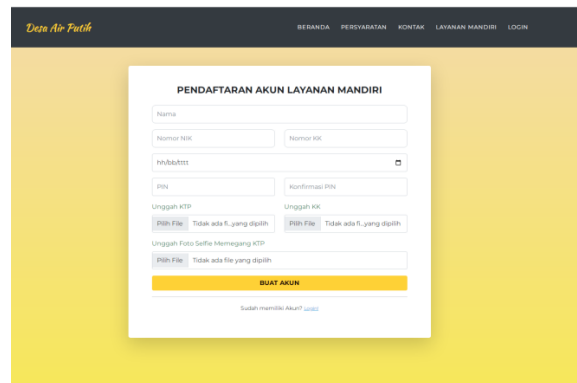


Figure 3: Registration Page.

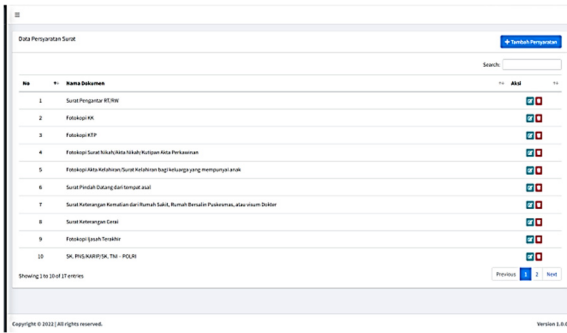


Figure 4: Page Requirements letter.

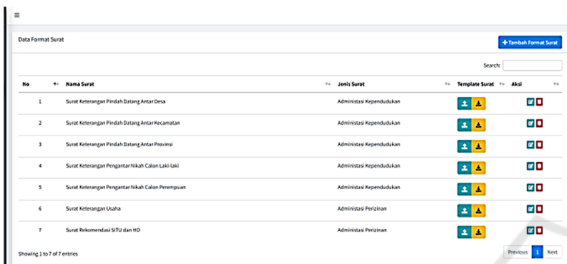


Figure 5: Page Format of the letter.

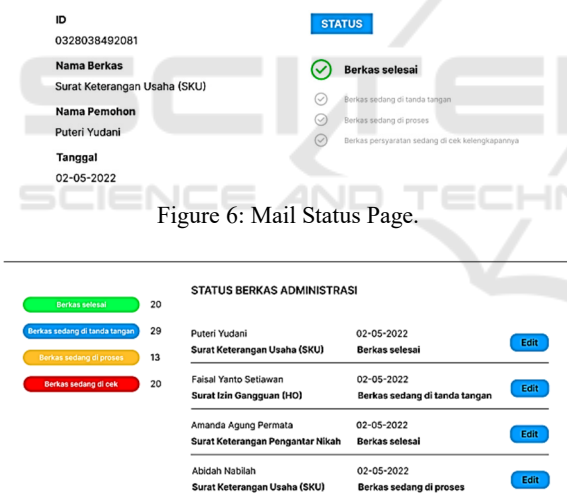


Figure 7: Manage Mail Status Page.

4.3 Coding

The stages in coding are divided into:

4.3.1 Refactoring

Refactoring stage, researchers implemented a simple line of code structure. This village administration service application was developed using the PHP programming language combined with HTML, CSS,

and frameworks laravel. Using Visual Studio Code compiler and MySQL database.

4.3.2 Pair Programming

The pair programming stage is carried out by two people. The researcher makes the application program code, if there is an error or error then the other colleagues correct and correct the error from the program code.

4.4 Testing

In this study, testing was carried out by conducting acceptance testing in accordance with the acceptance test criteria that had been made at the planning stage. Then get results testing using black box testing the Equivalence Partitioning method.

Table 7: Test Result.

1 iteration				
No	User Stories	Acceptance test criteria	Expected results	Status
1.	The public can choose the service category	A page display appears according to the selected category	The system displays pages according to the selected category	Succeed
2.	The public can fill out the administrative file submission form	The administrative file submission form appears	The system displays the administrative file submission form	Succeed
		Form data has been successfully entered	System add form data	Succeed
3.	Village devices can log in	Village officials can enter a username and password	The system displays the login page	Succeed
		Successfully logged in and entered the village device page	The system displays the village device page	Succeed
4.	Village officials can log out	Village officials can exit the village apparatus page	The Village apparatus exits the system	Succeed
		Go to the app home page	The system displays the app homepage	Succeed

Table 7: Test Result (cont).

Iteration 2				
No	User Stories	Acceptance test criteria	Expected results	Status
5.	The public can upload the administrative requirements file	The display for uploading the administrative requirements file appears	The system displays the administrative requirements file upload page	Succeed
		A notification appears that the required file has been uploaded successfully	The system displays a notification message " requirement file uploaded successfully "	Succeed
6.	Village officials can view data on the administrative file submission form	The data display of the administrative file submission form appears	The system displays the administrative file submission form data	Succeed
7.	Village officials can download administrative requirements files	The administrative requirements file download screen appears	The system displays the administrative requirements file download page	Succeed
		File downloaded successfully	The Village device successfully downloaded the file	Succeed
Iteration 3				
8.	Village officials can manage service categories	Village officials can add, edit, and delete service categories	The system displays the service category page, Village officials can add, edit, and delete service categories	Succeed
9.	Village officials can manage administrative files	Village officials can add, edit, and delete administrative files	The system displays the administrative file page, Village apparatus can add, edit, and delete administrative files	Succeed
10.	The public can download the approved administrative files	The administrative file download screen appears	The System displays administrative file download	Succeed
		Administratio n file downloaded successfully	The public has successfully downloaded the administrative file	Succeed

Iteration 4				
No	User Stories	Acceptance test criteria	Expected results	Status
11.	Village officials can manage the status of administrative files	Village officials can add, edit, and delete administrative file status	The system displays the administrative file status page, village officials can add, edit, and delete administrative file status	Succeed
12.	The public can see the status of administrative files	The administrative file status display appears	The system displays the administrative file status page for the public	Succeed
13.	The Village head can log in	The village head can enter a username and password	The system displays the login page	Succeed
		Successfully logged in and entered the village head page	The system displays the village head page	Succeed
Iteration 5				
14.	Village officials can manage monthly reports	Village officials can add, edit, and delete monthly reports	The system displays the monthly report page, Village officials can add, edit, and delete monthly reports	Succeed
15.	The village head can see the status of the administrative files	The administrative file status display appears	The system displays the status of administrative files	Succeed
16.	The village head can see the administrative files	The administrative file data display appears	The System displays administrative file data	Succeed
17.	The village head can see the monthly report	The Monthly report display appears	The System displays data monthly report	Succeed
18	The village head can log out	The village head can get out of the village head's yard	The village head exits the system	Succeed
		Go to the app home page	The system displays the village head application at home	Succeed

5 CONCLUSION

The result of this research is that the extreme programming method can be well applied to the application of population administration services and village licensing arrangements and produces applications that suit the needs.

The results of testing the permit application and village population using the black box provide documentation of the conformity testing of the system quality test has been applied. Testing using black box-based equivalence partitionings provides convenience in conducting the testing process based on the Acceptance test criteria that have been determined in advance.

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