

Reflective Software Engineering

Module 07b:
Estimation using Leap

(1)



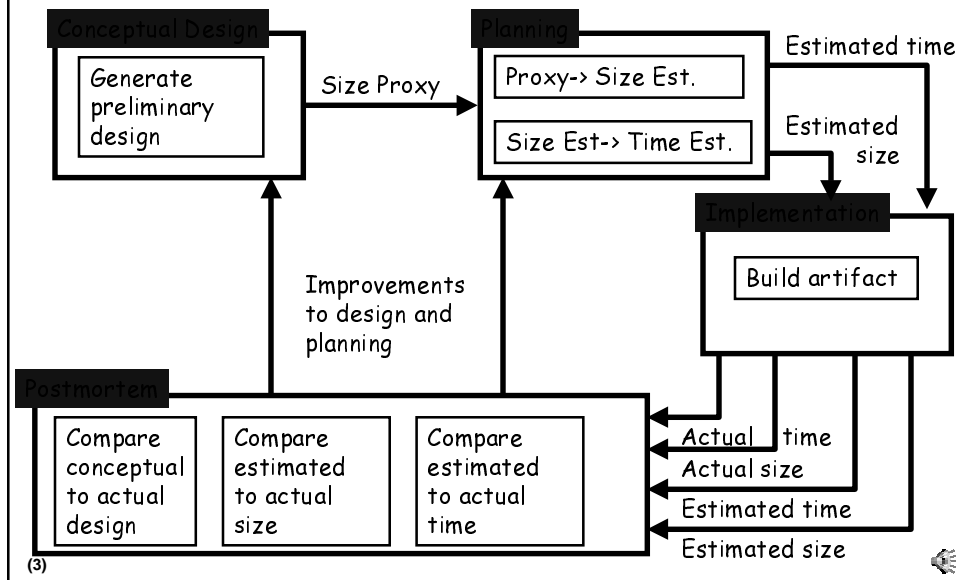
Objectives

Understand the step-by-step approach to estimation using the Leap toolkit.

(2)



Review: Size & Time Estimation



Overview of Leap estimation procedure for this course

1. Develop conceptual design and size proxy
-Design and proxy are new and changed methods and classes.
2. Convert proxy to size units (LOC)
3. Enter size plan into Leap
4. Investigate various size->time mappings
5. Evaluate mappings, pick time estimate.
6. Divide time estimate among phases.
7. Carry out project, record time and size.
8. Compare estimates to actuals in Postmortem.

(4)

1. Develop conceptual design and size proxy

Define a new leap project, and record time spent in this phase as "design"

Produce a design from requirements and identify all new classes and methods needed.

If you are building off a prior system, also identify all classes and methods to be modified.

Your size proxy is this specification of the new and modified classes and methods.

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2. Convert proxy to LOC

A simple, example approach:

- 1. Calculate your average LOC/method.
- 2. Multiply your number of new/changed methods by your average LOC/method to estimate your total new/changed LOC.

A more sophisticated example approach:

- 1. Calculate your average LOC/method
- 2. Multiply your *new* methods by the average.
- 3. Use average/2 for *changed* methods.

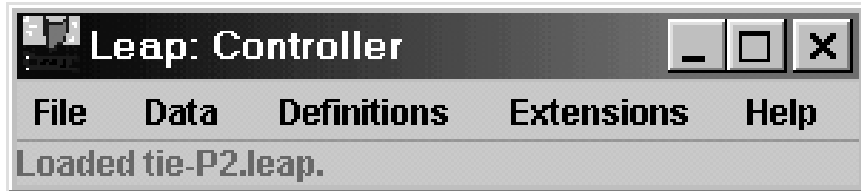
You choose, but record the method used.

(6) (This effort starts "planning" phase.)



3. Enter size plan into Leap

A. Load your leap data set.



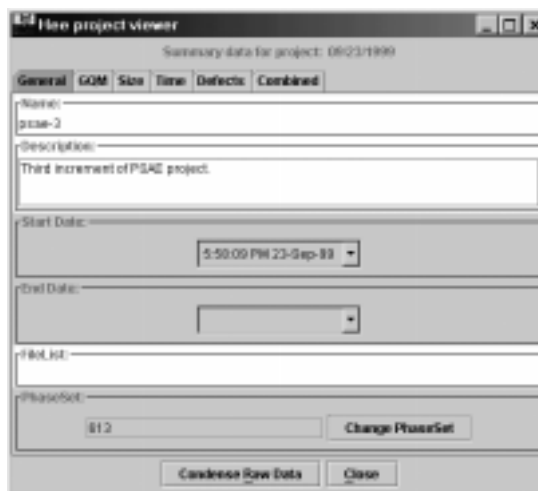
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3. Enter size plan into Leap

B. Find your new project definition in Hee.

- Ensure that name, description, start, phaseset are supplied.



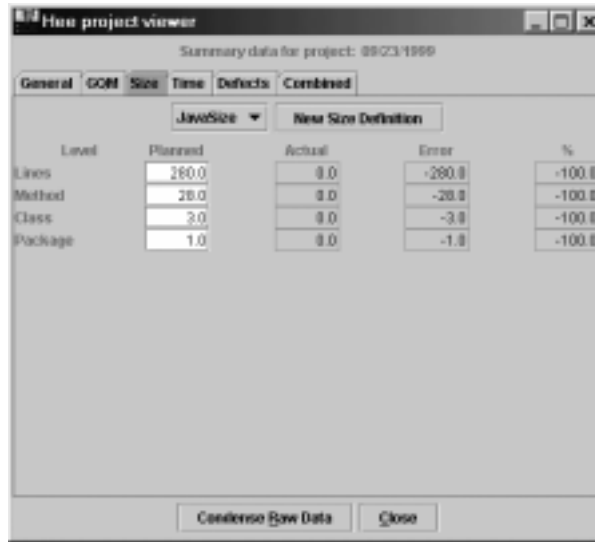
(8)



3. Enter size plan into Leap

C. Click on size tab, choose "JavaSize".

D. Enter your planned size estimate in lines, methods, classes, and packages.



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3. Enter size plan into Leap

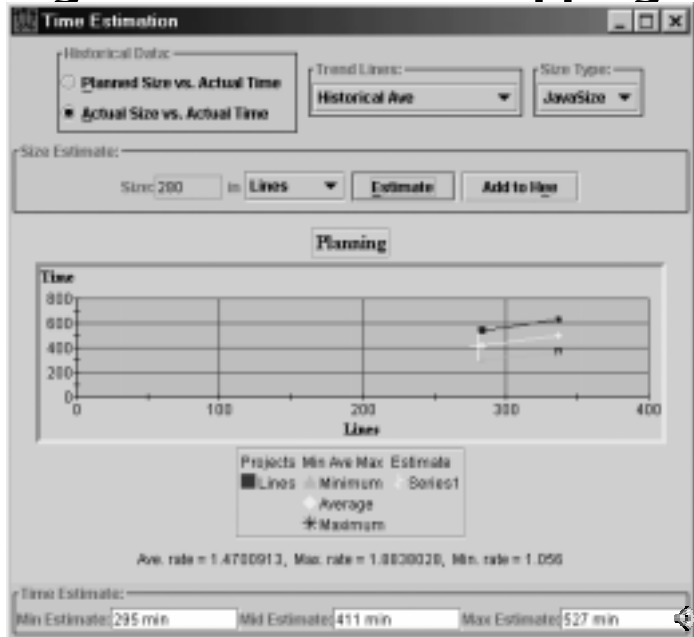
E. Click on time tab, press "Time Estimation".



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4. Investigate size/time mappings

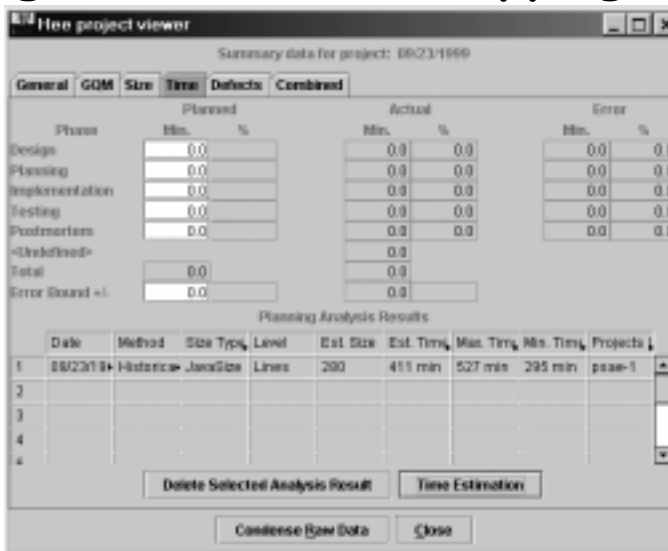
- A. Choose a method for trend lines.
- B. Choose a size level (lines, methods, classes)
- C. Click "Estimate" and review time estimates.



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4. Investigate size/time mappings

- D. If estimate seems plausible,
 - Click "Add to Hee" button.
 - This sends estimate to time tab window.



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4. Investigate size/time mappings

E. Change either trend method or size level.

F. Press "estimate" to get new estimate.

G. If plausible estimate, press "Add to Hee".



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4. Investigate size/time mappings

H. When all plausible estimates have been sent to Hee, close Time estimation window and return to Hee Time tabbed window.



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5. Evaluate mappings, pick estimate

N. Review plausible time estimates, and choose one (or an interpolation of two).

Summary data for project: 99231999

Phase	Planned		Actual		Error	
	Min.	%	Min.	%	Min.	%
Design	0.0		0.0	0.0	0.0	0.0
Planning	0.0		0.0	0.0	0.0	0.0
Implementation	0.0		0.0	0.0	0.0	0.0
Testing	0.0		0.0	0.0	0.0	0.0
Postmortem	0.0		0.0	0.0	0.0	0.0
<Undefined>			0.0			
Total	0.0		0.0			
Error Based +/-	0.0		0.0			

Planning Analysis Results

Date	Method	Size Type	Level	Est Size	Est Time	Max Time	Min Time	Projects
1	992319-Historic	JavaSize	Lines	280	411 min	527 min	295 min	page-1
2	992319-Historic	JavaSize	Method	28	436 min	516 min	258 min	page-2
3								
4								
5								

Buttons: Delete Selected Analysis Result, Time Estimation, Condense Raw Data, Close

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What are implausible estimates?

Things that make an estimate suspect:

- any regressions in which a size estimate is near or beyond the ends of the dataset.
- Beta1 values equal to or larger than the time estimate.
- Low r-squared values, $< .50$.
- Projects with small sizes tend to be more difficult to estimate.
- A dataset with "skews" due to outliers or combinations of large and small projects. In this case, you may want to filter the set of projects shown in Ilio and restart Hee. Only the visible projects in Ilio are used in Hee estimation.

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6. Divide total time among phases

You can use either historical percentages or your own best estimate. Note that design phase is already done by this time!

Phase	Planned		Actual		Error	
	Min.	%	Min.	%	Min.	%
Design	50.0	14.3	0.0	0.0	-50.0	-100.0
Planning	20.0	7.1	0.0	0.0	-20.0	-100.0
Implementation	200.0	47.8	0.0	0.0	-200.0	-100.0
Testing	100.0	23.8	0.0	0.0	-100.0	-100.0
Postmortem	30.0	7.1	0.0	0.0	-30.0	-100.0
<Undefined>			0.0	0.0		
Total	400.0		0.0			
Error Based +/-	84.0	20.8	-420.0	-100.0		

Planning Analysis Results								
Date	Method	Size Type	Level	Est. Size	Est. Time	Max. Time	Min. Time	Project Usage
09/23/1999	Historical	JavaSize	Method	28	438 min	516 min	356 min	psae-2
09/23/1999	Historical	JavaSize	Lineo	260	411 min	527 min	295 min	psae-1

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7. Carry out project

Implement and test system.

Record time and final size of system.

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8. Postmortem

Analyze differences between estimated and actual in Hee using size, time, and combined windows.

Use the differences to generate ideas on how to improve:

- conceptual design
- size estimates
- mapping from size to time
- time partition amongst phases
- development

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Postmortem data: size

Level	Planned	Actual	Error	%
Lines	280.0	337.0	57.0	20.4
Method	28.0	28.0	0.0	0.0
Class	3.0	9.0	6.0	200.0
Package	1.0	2.0	1.0	100.0

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Postmortem data: time

Summary data for project: psae-3 09/23/1999

General GQM Size **Time** Defects Combined

Phase	Planned		Actual		Error	
	Min.	%	Min.	%	Min.	%
Design	60.0	15.4	69.0	14.8	9.0	15.0
Planning	30.0	7.7	13.0	2.8	-17.0	-56.7
Implementation	200.0	51.3	300.0	64.4	100.0	50.0
Testing	100.0	25.6	74.0	15.9	-26.0	-26.0
Postmortem	0.0	0.0	10.0	2.1	10.0	0.0
<Undefined>			0.0			
Total	390.0		466.0			
Error Bound +/-	84.0		76.0	19.5		

Planning Analysis Results

	Date	Method	Size Type	Level	Est. Size	Est. Time	Max. Time	Min. Time	Projects U
1	09/23/199	Historical	JavaSize	Method	28	436 min	516 min	356 min	psae-2
2	09/23/199	Historical	JavaSize	Lines	280	411 min	527 min	295 min	psae-1
3									

Buttons: Delete Selected Analysis Result, Time Estimation, Condense Raw Data, Close

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Postmortem data: combined

Summary data for project: psae-3 09/23/1999

General GQM Size Time Defects **Combined**

Productivity Yield Density

JavaSize ▾ New Size Definition

Level	Planned	Actual	Error	%
Lines/hour	43.1	43.4	0.3	0.7
Method/hour	4.3	3.6	-0.7	-16.3
Class/hour	0.5	1.2	0.7	151.1
Package/hour	0.2	0.3	0.1	67.4

Buttons: Condense Raw Data, Close

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When you have more data...

Currently, with only a small number of projects, you cannot assess **trends** in planning, such as:

- is size planning improving or not over time?
- Is time planning improving or not over time?

Leap contains charts to help assess these trends.

We will use these and other tools later on in the semester!

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End of Module 07b

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