Exploratory Modeling: Extracting Order from Chaos

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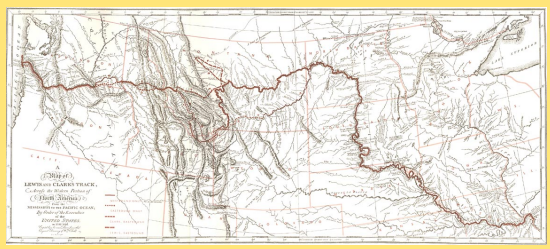
Test Architect
Microsoft Engineering Excellence Group

Some Perspective on the Issues

"In freestyle exploratory testing, the only official result that comes from a session of ET is a set of bug reports."

- James Bach **Exploratory Testing Explained**



"After the journals, Clark's map was the most valuable treasure that the expedition generated."

- Ken Rogers, **Lewis & Clark: Landmarks of the Trail**

Why Are Maps Important?

- For understanding
  - where you are and
  - what you're doing
- For communication
  - With your team
  - With those that will follow
- For future work
  - In case you pass this way again

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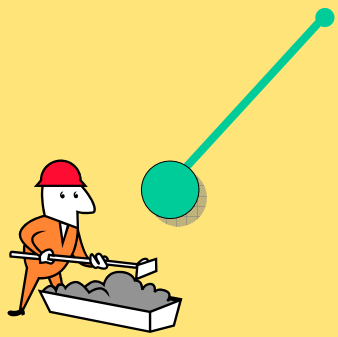
Early Days: Test Cases Written in Concrete



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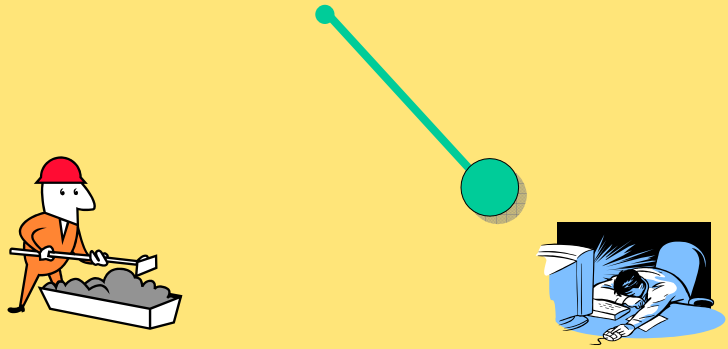
Middle Days: The Swing to Exploratory



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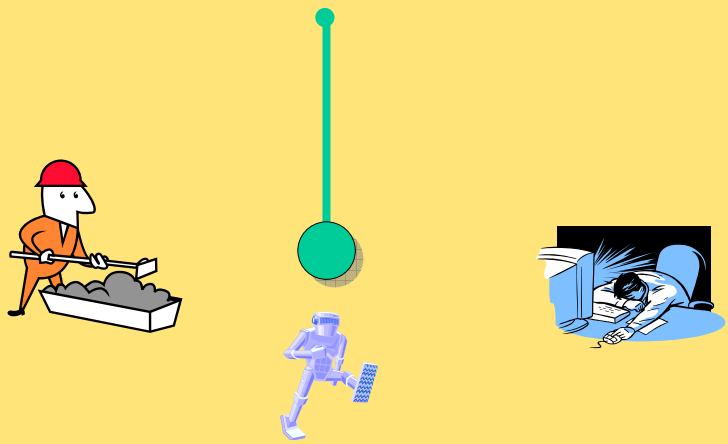
Nowadays: Finding a Balance



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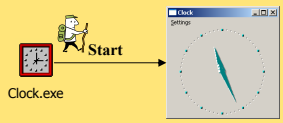
Exploratory Testers Keep Their Models in Their Heads



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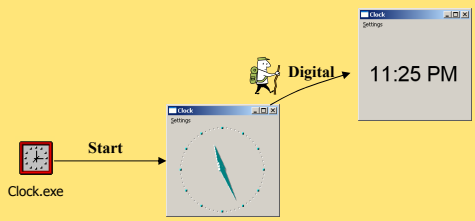

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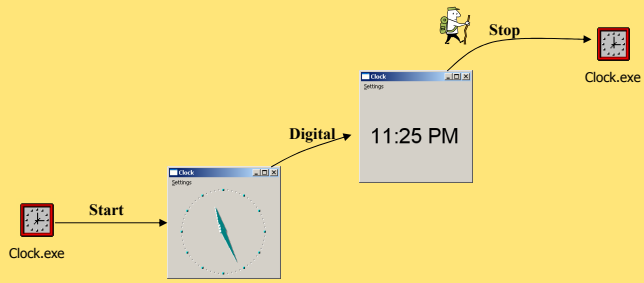

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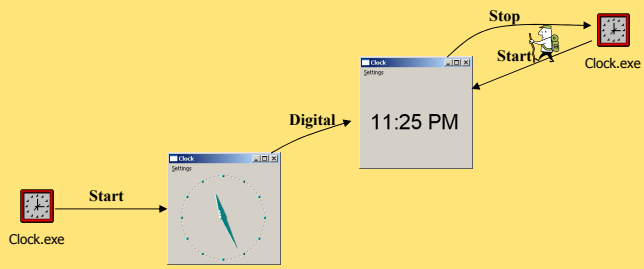
Exploratory Testers Keep Their Models in Their Heads



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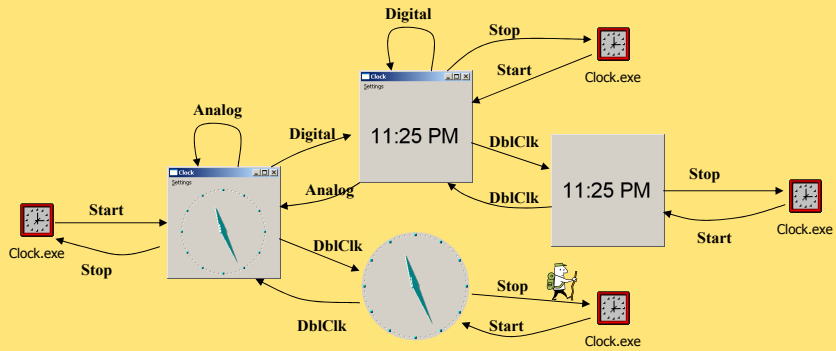
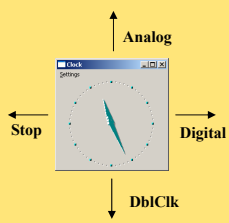
But It Can Get Pretty Crowded in There …

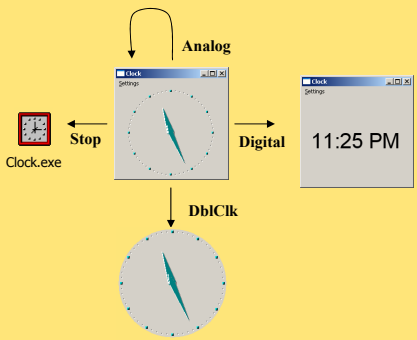


Exploratory Modeling Makes Mental Models Explicit

What can I do?



Where do I end up?



Rules for the "Start" action

Natural Language

If the Clock is Not Running, then the user can execute the 'Start' action.

C#

Pre-condition

```
// Start: if Not Running, then enable Start
if (AppStatus == AppStatusValues.NotRunning)
{
    enabledActions.Add("Start");
}
```

Action

```
static void Start()
{
    AppStatus = AppStatusValues.Running;
}
```

Rules for the "Digital" action

Natural Language

If the Clock is Running with a Frame, then the user can execute the 'Digital' action.

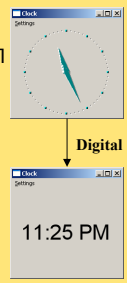
C#

Pre-condition

```
// Digital: if Running with Frame, then enable Digital
if ((AppStatus == AppStatusValues.Running)
&& (FrameStatus == FrameStatusValues.Frame))
{
    enabledActions.Add("Digital");
}
```

Action

```
static void Digital()
{
    ModeStatus = ModeStatusValues.Digital;
}
```



Rules for the "DoubleClick" action

Natural Language

If the Clock is Running, then the user can execute the 'DoubleClick' action.

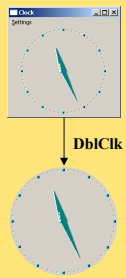
C#

Pre-condition

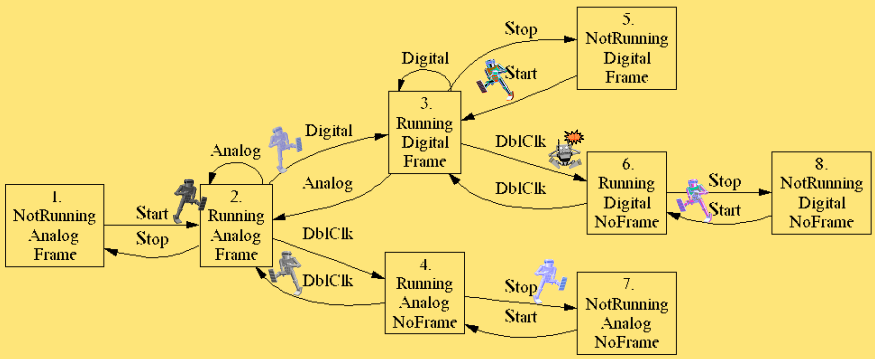
```
// DoubleClick: if Running, then enable DoubleClick
if (AppStatus == AppStatusValues.Running)
{
    enabledActions.Add("DoubleClick ");
}
```

Action

```
static void DoubleClick()
{
    if (FrameStatus == FrameStatusValues.Frame)
        FrameStatus = FrameStatusValues.NoFrame;
    else
        FrameStatus = FrameStatusValues.Frame;
}
```



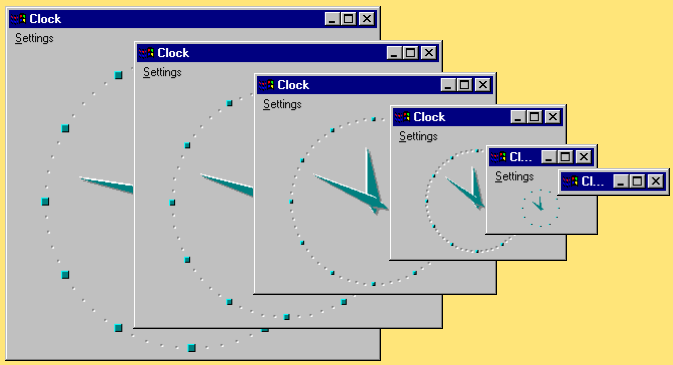
Rules Allow Us to Build a Machine-Readable Model



… and that means machines can create tests for us!

What Kinds of Bugs Do These Models Find? (1)

Start
Maximize
Stop
Start
Minimize
Stop
Start
Restore
Stop



The Incredible Shrinking Clock

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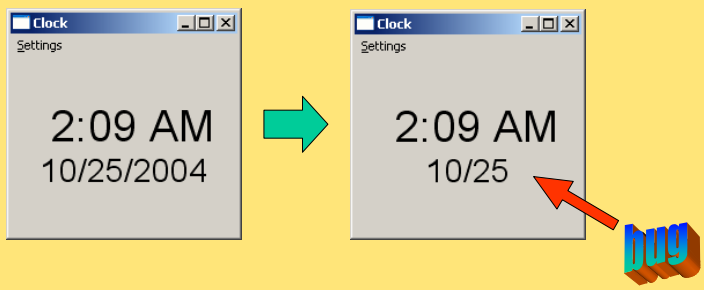
What Kinds of Bugs Do These Models Find? (2)

Start
Minimize
Stop
Start
Restore
Date



That Was The Year That Wasn't

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Bonus! Automatically Reduce a Bug Repro Sequence

start about ok_about no_title doubleclick seconds restore seconds doubleclick doubleclick date about ok_about restore gmt maximize doubleclick doubleclick date seconds date stop start stop start stop start seconds date restore about ok_about no_title doubleclick digital doubleclick doubleclick no_title doubleclick no_title doubleclick seconds restore restore doubleclick doubleclick gmt analog maximize date digital minimize restore **minimize stop start restore** digital date minimize stop start maximize gmt digital restore doubleclick doubleclick about ok_about maximize digital digital digital seconds analog about ok_about about ok_about minimize stop start restore **date**

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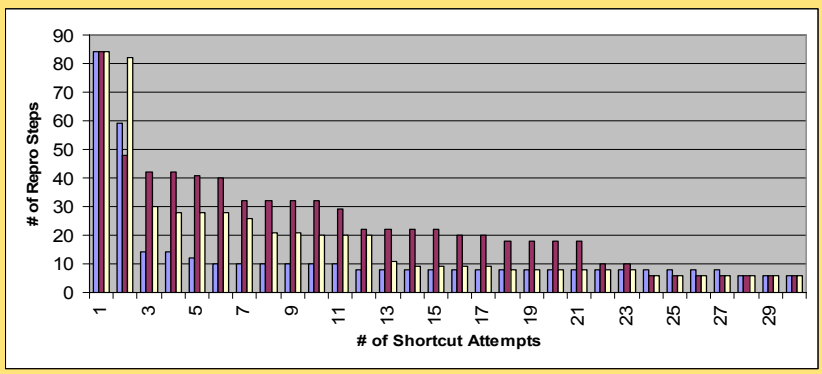
Repro Steps Over Time



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Attributes of Good Exploratory Models

- Lightweight
- Easy to maintain
- Down-to-earth
- Inventive!
- Good bug finders

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When Should You Use Exploratory Models?

- When you are going to iterate through the feature
- When you have idle CPUs
- When you want to get it right

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How Do Exploratory Models Change the Landscape?

- They help you find design issues early in the cycle
- They amplify your testing by the machines you can give them
- Design skills matter more than caffeine tolerance
- You have automated tests running from version 0.1

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