

Support for User Hypotheses in Problem Diagnosis

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E-Commerce is great but...

- What happens when something goes wrong?
 - "Your call is important to us.... Please enter your 15-digit card number, your PIN...if you're calling from a touch-tone phone, please press 6 for customer service now, ...This is customer service, can I have your card number?"
- Customers' frustration: Mistakes waste time, Vendors deflect problems and blame others
- Vendors' frustration: Customer support is expensive
- Credit Card Problems?

Overview

- Problems in E-Commerce
- Features of Solution - Woodstein
- Enable User to Review History
- Support for Diagnosing Problems
- Guide User in Generating and Testing Hypotheses

Establishing trust when things go wrong

- Customer should feel like
 - Vendor is *taking responsibility* for problems
 - Vendor is *proactive* in solving problems
- Limits to what one vendor can do
 - Customer support rep has to multi-task
 - Problems can require calls over several days
 - Problems may span multiple vendors
 - Customer is the only common element

Example Problem

- I am enrolled in the stock purchase plan of my employer, Yoyodyne.
- Every year, Yoyodyne purchases stock for me at its broker, SN-AFU
- Now the number of shares at SN-AFU looks wrong
- What went wrong? And how do I fix it?

General Problem

- User knows about problem only at a high level
 - “this looks wrong”
 - “this looks right”
- But problem diagnosis requires knowing the history to pinpoint the exact cause
 - See the overall process, then drill-down and/or
 - Start from symptom and work bottom-up
- Iteratively generate and test hypotheses about what went wrong

"Debugging" transactions is like debugging software

- *Visualization*: What's happening?
- *Localization*: Where is the problem?
 - Steppers and program slices are tools for localization
- *Instrumentation*: Trace or "audit" a particular component or event
- *Repair*: What are the consequences of proposed changes?
 - Track dependencies
- Diagnosis is just first three steps

Central Point to Inspect My Account Info and Processes

- Views with info for employer and brokers
- Step through procedures taken by employer and brokers
- Explanations for how and why steps happened and values were set
- Help user diagnose problems, then resolve, in other words, debug
- Software agent acts as assistant to user

Help from Software Agent: Woodstein

- Agent runs on user's computer
 - Shares records only with user
- Tracks user actions and web site reactions
- Matches with library of task models for actions on the web
- Provides an integrated view of processes
 - Even when they span multiple sites
 - What's the alternative?
- Supports problem diagnosis

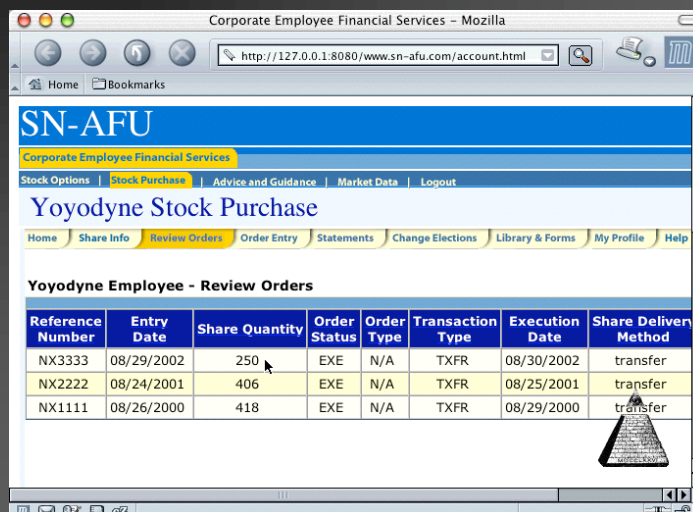
Agent Recognizes User Actions

- Proxy analyzes user's click-stream
 - Web page controls are instrumented
 - Page loads, clicks, text entry all recorded
- Recognize overall user action
 - "Purchase at Amazon.com"
- Retrieves data from related web pages
 - Check shipping status of ordered item

Support for Reviewing History

- Directly inspect page data and processes
 - Easily access their history
 - View saved copies of original pages in which they first appeared
- View actual details organized by abstract model of process
 - Step presented as part of overall process
 - Auto-generated audit trail for each data item

Browsing with Woodstein



Corporate Employee Financial Services - Mozilla

http://127.0.0.1:8080/www.sn-afu.com/account.html

SN-AFU

Corporate Employee Financial Services

Stock Options | Stock Purchase | Advice and Guidance | Market Data | Logout

Yoyodyne Stock Purchase

Home | Share Info | Review Orders | Order Entry | Statements | Change Elections | Library & Forms | My Profile | Help

Yoyodyne Employee - Review Orders

Reference Number	Entry Date	Share Quantity	Order Status	Order Type	Transaction Type	Execution Date	Share Delivery Method
NX3333	08/29/2002	250	EXE	N/A	TXFR	08/30/2002	transfer
NX2222	08/24/2001	406	EXE	N/A	TXFR	08/25/2001	transfer
NX1111	08/26/2000	418	EXE	N/A	TXFR	08/29/2000	transfer

Inspecting with Woodstein

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Click to select data item: "shares at sn afu: 250"

Asking "How" Data Was Set

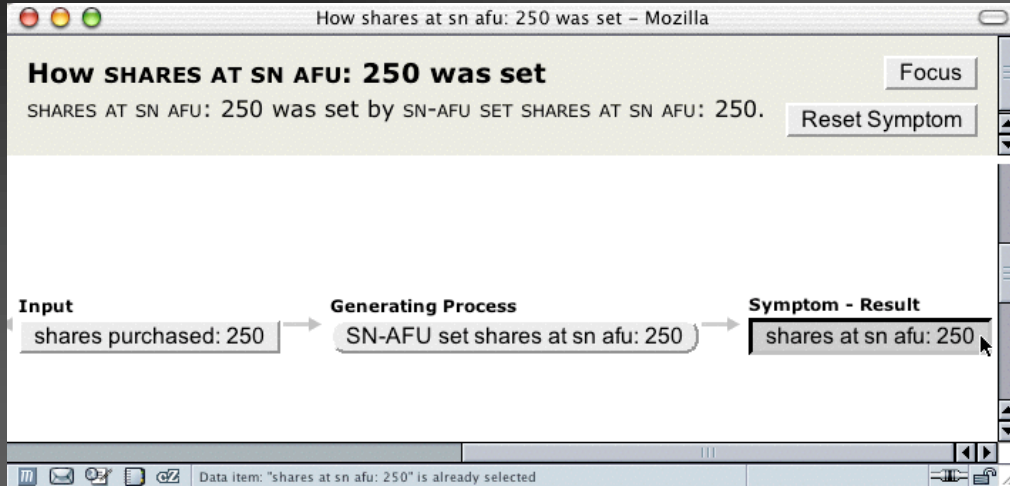
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Why was this set?
How was this set?
This looks Wrong

Find out how data item: "shares at sn afu: 250" was set

Woodstein's Data History View



View Page Saved by Woodstein

Saved Page for Yoyodyne set shares purchased: 250 - Mozilla

Saved Page for YOYODYNE SET SHARES PURCHASED: 250 Focus

Page where YOYODYNE SET SHARES PURCHASED: 250 happened Back

As a participant in Yoyodyne's Stock Purchase Plan (SPP), Stock Benefits provides this summary of important information about your SPP purchase.

Subscription Period: Beginning Date - August 24, 2001
Ending Date - August 28, 2002

	US Dollar
Previous Period Carry Forward Contribution	\$0
Current Period Contribution	\$8000
Total Contribution	\$8000
Grant Date Value on August 24, 2001	\$30
Purchase Date Value on August 28, 2002	\$25
Purchase Price	\$20
(80% of the lower of Grant Date or Purchase Date Value)	
Number of Shares	250
Cost of Shares	\$5000
Remaining Balance	\$3000

Unless you selected QUICKSale, electronic share transfer, or physical certificate as your SPP distribution election, your shares of Yoyodyne

Process: "Yoyodyne set shares purchased: 250" is already selected

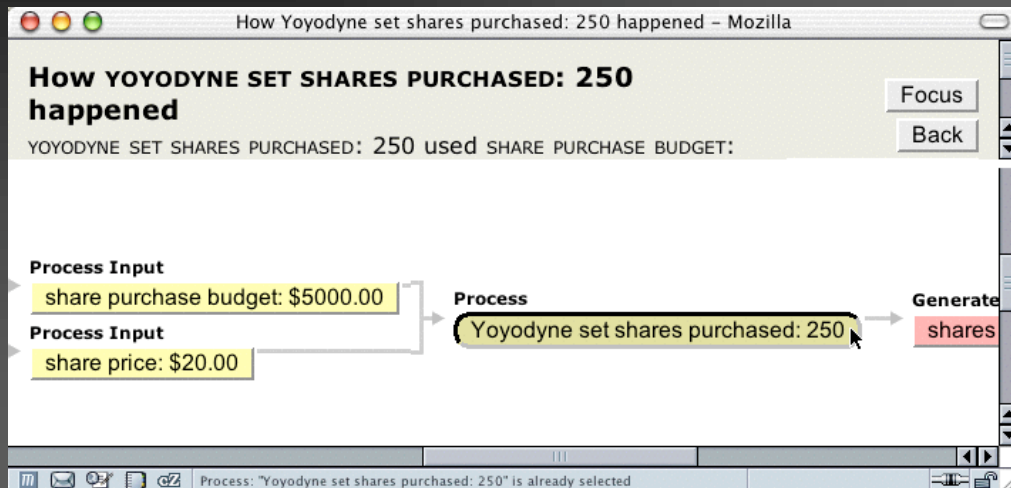
Agent Support for Debugging

- Visualize user process
- Jump forward and backward
- Supports "detective work" of diagnosing problems
 - Judging correctness of data and processes
 - Generating hypotheses about cause
 - Testing, eliminating alternatives

Guide User through the Process of Elimination

- User can see all possibilities
 - Explore possible causes of problem
 - Check them off as they are investigated
 - Automatically identify possible causes
- Help with staying focused
- Possibly use judgments for own reference, or send to others

Capturing User Judgments



Benefits of Saving Judgments

- Manage for own future reference
 - Situation evolves over time, user forgets
- Help in communicating problem
 - Agent can explain problem on behalf of user
 - Provide account numbers, transaction dates, history of attempts to resolve, etc.
 - Provide "bug reports"
- Customer support rep's agent works with customer's agent

Summary

- E-commerce problems are frustrating
- Woodstein recognizes user actions
 - explains process history at both high level and in details
- Support end-users in investigating and explaining problems
- Guides user in making judgments

Contact Info

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