Worksheets

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Worksheets are Dynamic, Interactive Webpages

Educational Exercises

Simulations

Programsheets

Tax Forms

Expense Reports
Demo: Worksheet

**Academic Programsheet**

Checking compliance w.r.t academic program (UG / MS) requirements in the CS Department at Stanford
Creating Worksheets

The Big 5
Do you master them all?
Worksheets.Stanford.EDU

The DIY Approach

Set up Worksheets in WYSIWYG fashion using Logical Rules
No traditional programming required

Cloud Based
No need to install hardware or software

Easy to Manage
Through Dashboards and drop down lists
Worksheets Editor

WYSIWYG Editor for creating and editing worksheets

Demo: Worksheet Editor
Personal and collaborative **worksheets**

**Workbook**
of worksheet submissions

**Workspaces**
integrating heterogenous worksheets
Origins in Spreadsheets

Huge success
- individual users
- companies
- conglomerates

Strengths
- automatic computation of values
- ease of specification using simple math formulas
Spreadsheets

Limitations

Functional formulas
\[ C1 = A1 + B1 \]

what if we had \( C1 \geq A1 + B1 \) instead?

<table>
<thead>
<tr>
<th>A1</th>
<th>B1</th>
<th>C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Unidirectional Updates
Constraint Violations

Take exactly one of CS 157 or PHIL 161

☐ CS 157  ☐ PHIL 161

Inconsistency!

What can be done?
1. Pinpoint the violation, and give some kind of visual feedback to the user

Take exactly one of CS 157 or PHIL 161

Logical Spreadsheets, Michael Kassoff (Thesis), 2011
Violation management for relational data, Eric Kao (Thesis), 2015
Constraint Violations

Take exactly one of CS 157 or PHIL 161

What can be done?
2. Repair the violation

In this case the repair is simple, i.e., to automatically select PHIL 161 and remove the selection CS 157
Constraint Violations

**Take at most 2 courses** from:
- CS 157
- PHIL 161
- STATS 116

What should be the repair?

Delete CS 157?  
Delete PHIL 161?  
Delete both?  
Disallow STATS 116?

Let the worksheet creator decide using **Update Policies**!

Update Policies, Abhihekt Mohapatra, Sudhir Agarwal, Michael Genesereth, AI '16
Worksheet Foundations
Repairing Violations

Satisfy course prerequisites
Note: CS 157 is a prerequisite for CS 227
CS 161 is a prerequisite for CS 261

Suppose, cs157 is not checked
cs227 is checked by the user
we have a violation!

One update policy is to automatically check cs157 in response

value(cs227, true) => value(cs157, true)
Summary

• Worksheets are dynamic, interactive webpages

• Traditional approaches to create worksheets require extensive expertise in different programming languages or access to good programmers

• DIY Approach to building Worksheets using Logical Rules

• Get started at Worksheets.Stanford.EDU
  - After signing in, WYSIWYG editor accessible
  - Tutorials, and References

• Deal with inconsistencies through visual feedback to users, and update policies specified by admins
World Data Web

“Correct-on-Capture”

- Majority of structured data on web generated as output of online forms.

- Shift our focus on validating data at entry point rather put significant effort to clean it later
Teaching Tool for Logic

Rules have tangible effects - reflected in a worksheet's UI