Implementation of Assigning Groups Using GroupEng

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Why Not Let Students Self-Select Groups

- Students are happier
- Less work for faculty

Self-Selected Student Groups

- Students are happier **Except** for the "other" students
- Less work for faculty **Until** teaching gets harder

Who feels left out?

- Weak students
- Loners
- Friendship circles that don't match group size
- "Different" students
  - Disabled students
    Women
    Under-represented minorities
    Foreign language students

  ⇒ increased risk of attrition from engineering

Teaching becomes more difficult

- Cliques form
- Class spreads apart
- Strong groups race ahead and expect more but may not fully explore early steps
- Weak groups struggle and get futher behind

- Who do you teach to?
- More office hours?

Advantages of Assigning Groups

- Mixed ability teams help all learners
- Diversity of team members increases learning
  - Major, learning styles, background, skills, …
- Class stays cohesive
- Fair teams with balanced strength
- Group selection doesn't marginalize some students, no hurt feelings
- Group is more task focused

Best Practics in Assigning Groups

- Avoid isolating any minority group (women, urm, …)
- Form multidisciplenary groups
- Ensure balanced strength groups
- Mix international and domestic students
- Mix learning styles within groups
- Ensure each group has necessary skillset
- Consider group size versus workload
- Limit group size

Approaches to Assigning Groups

By Hand	With GroupEng
Sort and Filter in Excel	Write specification file, run GroupEng
Good group selection takes hours	Good group selection takes a few minutes

Create Rules for Your Class

1. List rules for assigning groups in your class.

2. Put one rule per notecard in the center of the card.

3. Prioritize the rules and order the notecards from highest to lowest priority.

Peoples have goals and criteria

Computers need rules and operations

Grouping criteria become operators and attributes

GroupEng Uses Four Operators

Balance

Examples

GPAs

Test 1 scores

Pre-test scores

Cluster

Examples

Women

Minorities

Vison impaired + note taker

Distribute

Examples

Major

Year

Skills

Previous group

Aggregate

Examples

Project choice

Recitation section

Grad or ugrad

Major

Turn your rules into operations

For each rule

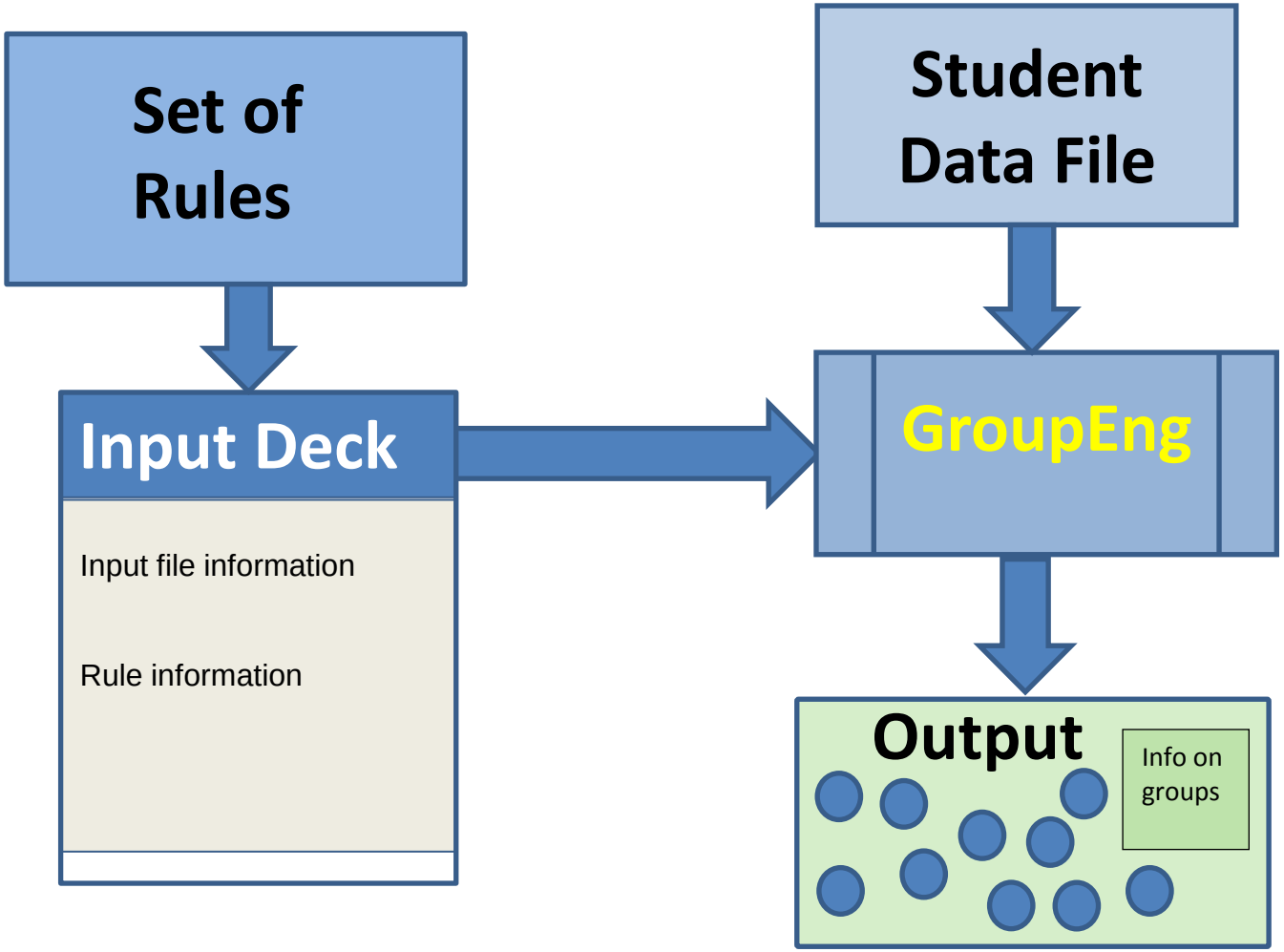
1. Chose operator
   (one of balance, cluster, distribute or aggregate)

2. Specify operand
   (category of student attributes, ex. gender)

3. Specify relevant values if needed
   (ex. What to cluster on, female)
   (ex. Equivalent values, BEE CALS = BEE ENG)

4. Write the rule at the top of the notecard

GroupEng Program

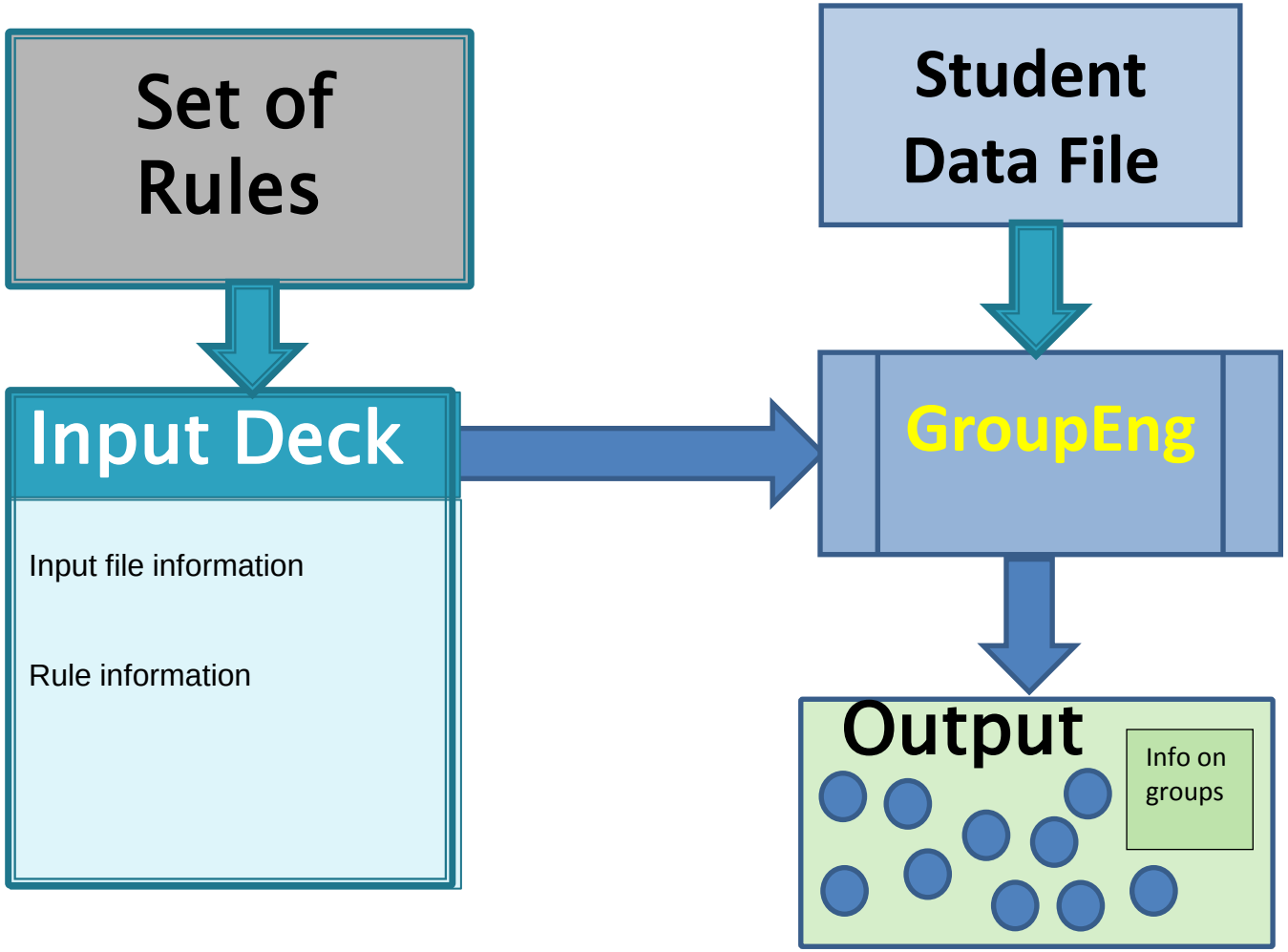


GroupEng Program

- Free
- Open source
- Written in Python
- Beta test version available at
  - www.GroupEng.org

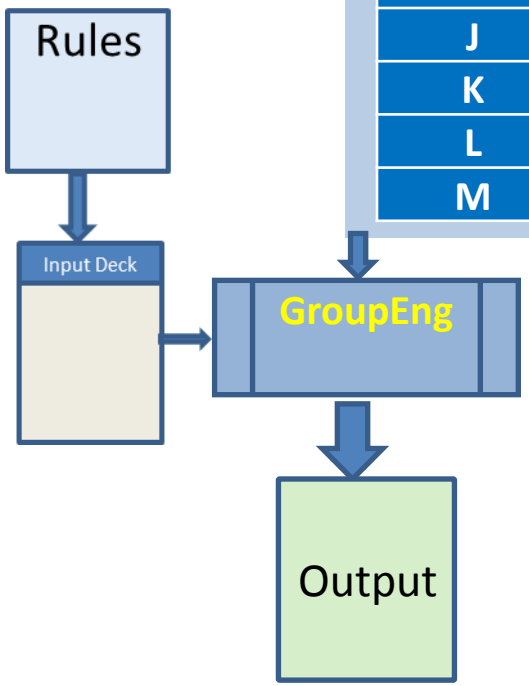
- Starting a listserve of potential users for update notification
- Questions: klc78@cornell.edu

GroupEng Program

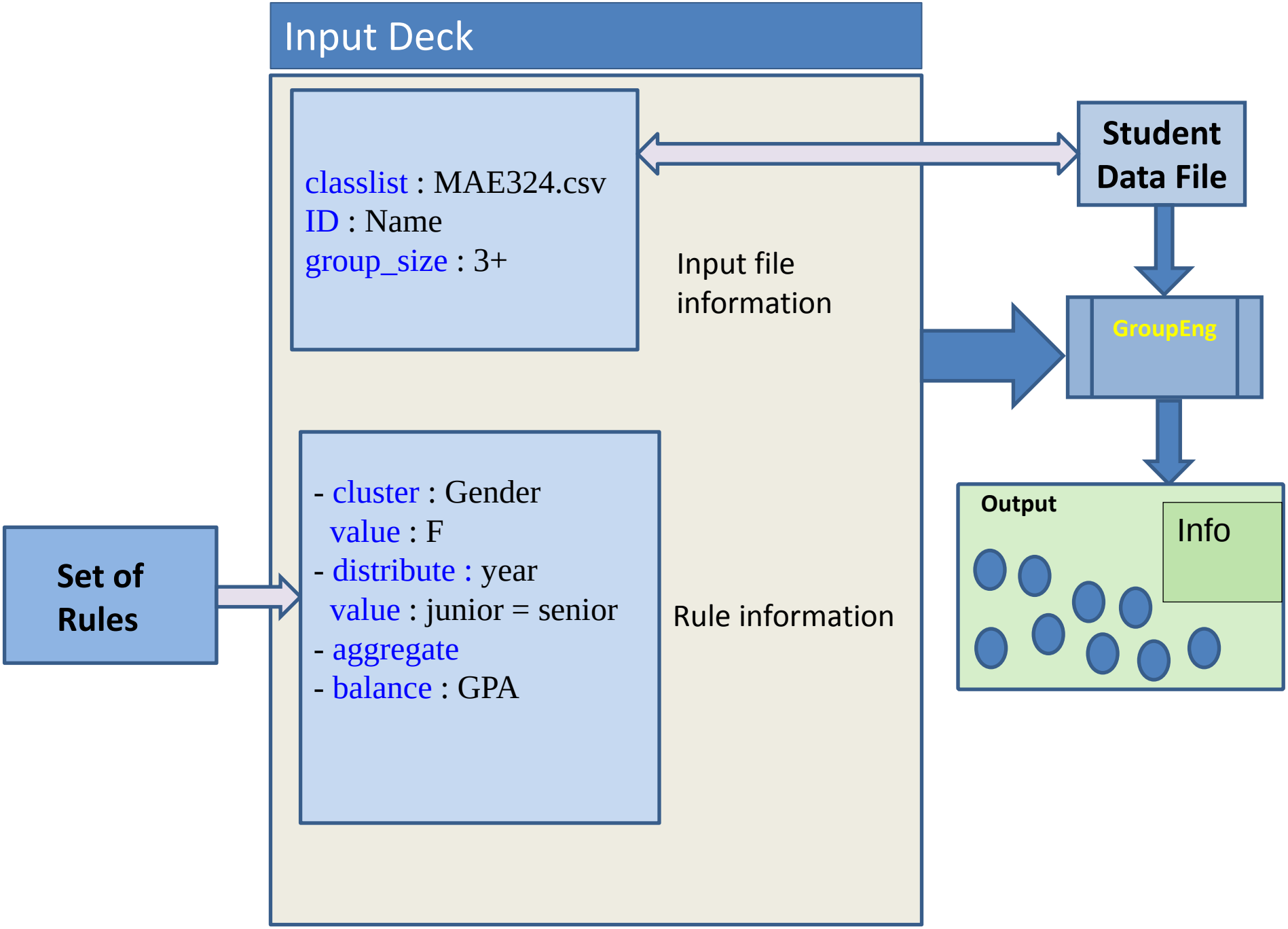


Student Data File

Name	GPA	Gender	Ethnicity	Major	prereq	skill1	skill2	skill3
A	2.02	M	-	3	-	y	y	y
B	2.93	F	-	3	y	y	y	y
C	3.21	M	-	1	-	-	y	-
D	3.19	M	B	3	-	y	y	y
E	4.27	F	-	4	-	y	y	y
F	3.16	F	-	4	-	-	-	-
G	1.92	F	-	1	-	y	y	y
H	2.85	F	H	1	-	y	y	y
I	3.47	F	H	3	y	y	y	-
J	2.89	F	-	1	y	-	y	-
K	3.12	F	-	1	y	-	y	y
L	3.02	F	-	4	y	y	y	-
M	3.12	F	H	2	y	y	y	y

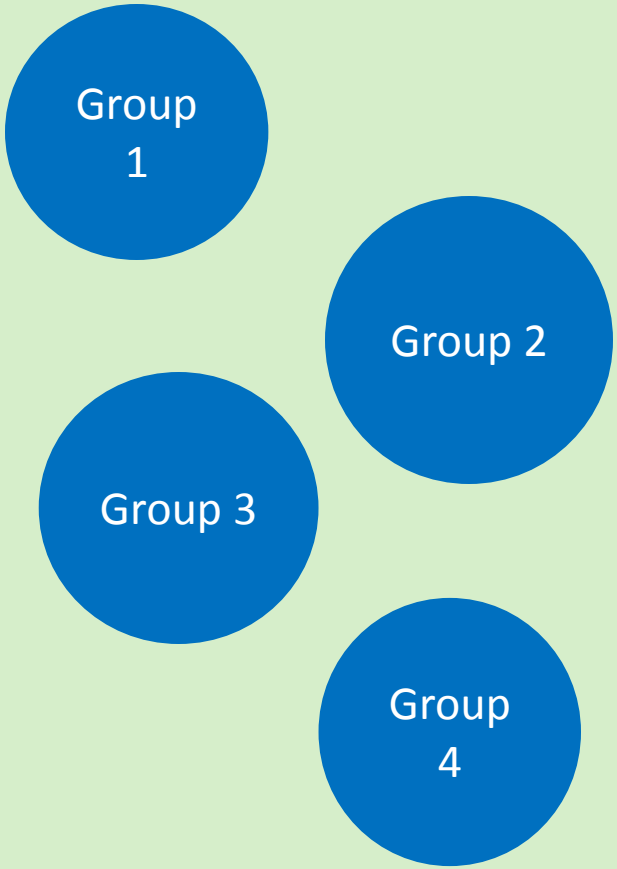


Save as csv file


Input Deck
classlist : MAE324.csv
ID : Name
group_size : 3+
Input file information
Student Data File
GroupEng
Output
Info
Set of Rules
- cluster : Gender
value : F
- distribute : year
value : junior = senior
- aggregate
- balance : GPA
Rule information

Run GroupEng

GroupEng Output



Class list with group numbers

Statistics on meeting rules

File for posting

Run GroupEng

1. **Go to http://www.GroupEng.org**
2. **Download GroupEng and Python**
3. **Save your input deck in your GroupEng folder**
4. **Open GroupEng.py**
5. **Select your input deck when prompted**
6. **GroupEng creates groups, output in new folder**

Website

- www.GroupEng.org
  - GroupEng program
  - Instructions
  - Sample class
  - WEPAN 2011 power point presentation
  - Our WEPAN 2011 Conference Paper

Acknowledgements

- DiOnetta Jones, formerly Director, Cornell Engineering Diversity Program Office (Now at MIT), for alerting me to the problem of self-selected groups for URMs

- Jamie Joyner, Assoc. Director, Cornell Engineering Diversity Program Office: assisted with group design criteria

Questions?

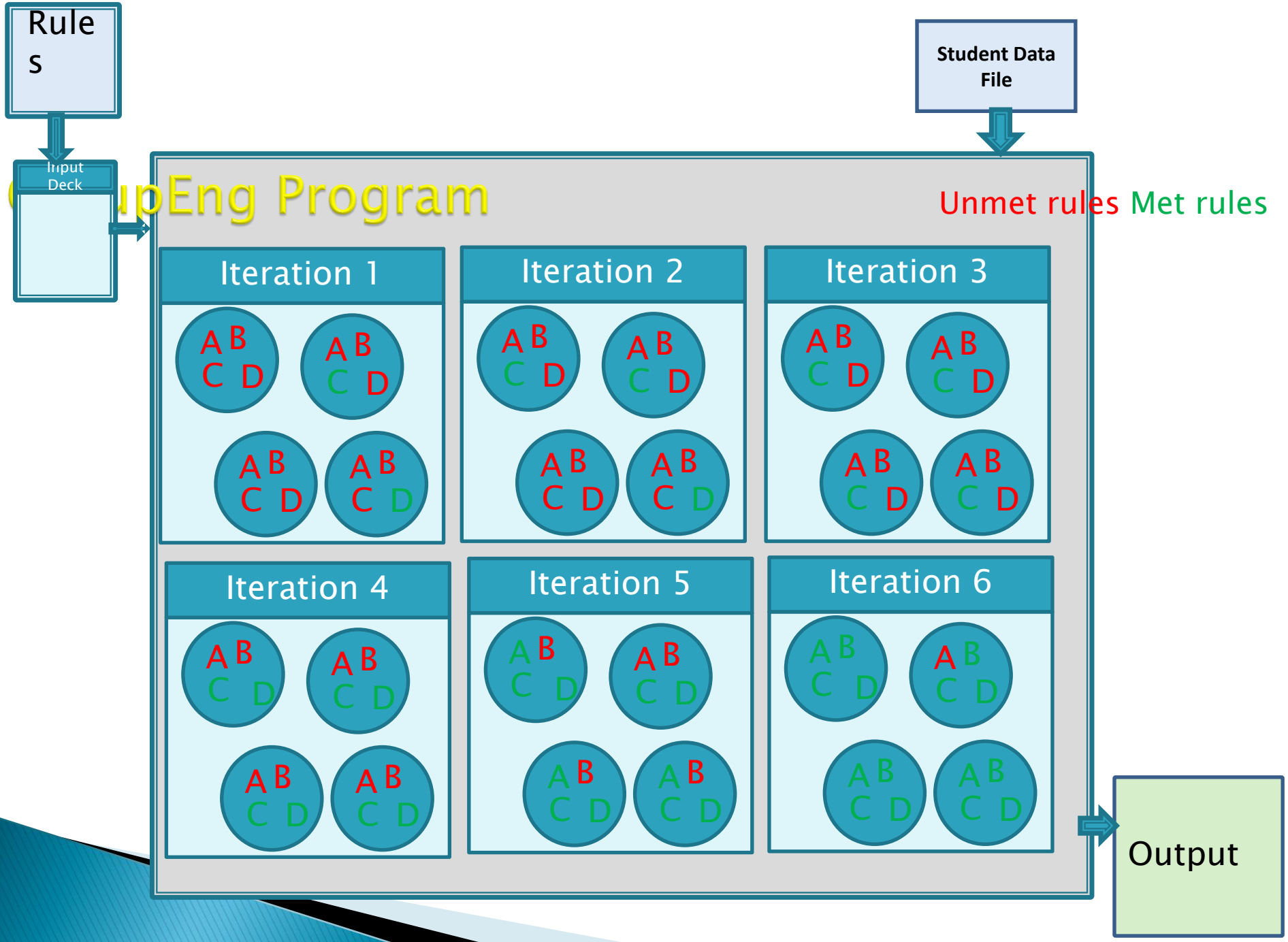
After the workshop:
GroupEngEdu@gmail.com
email Kathy at klc78@cornell.edu

Create Rules for Your Class

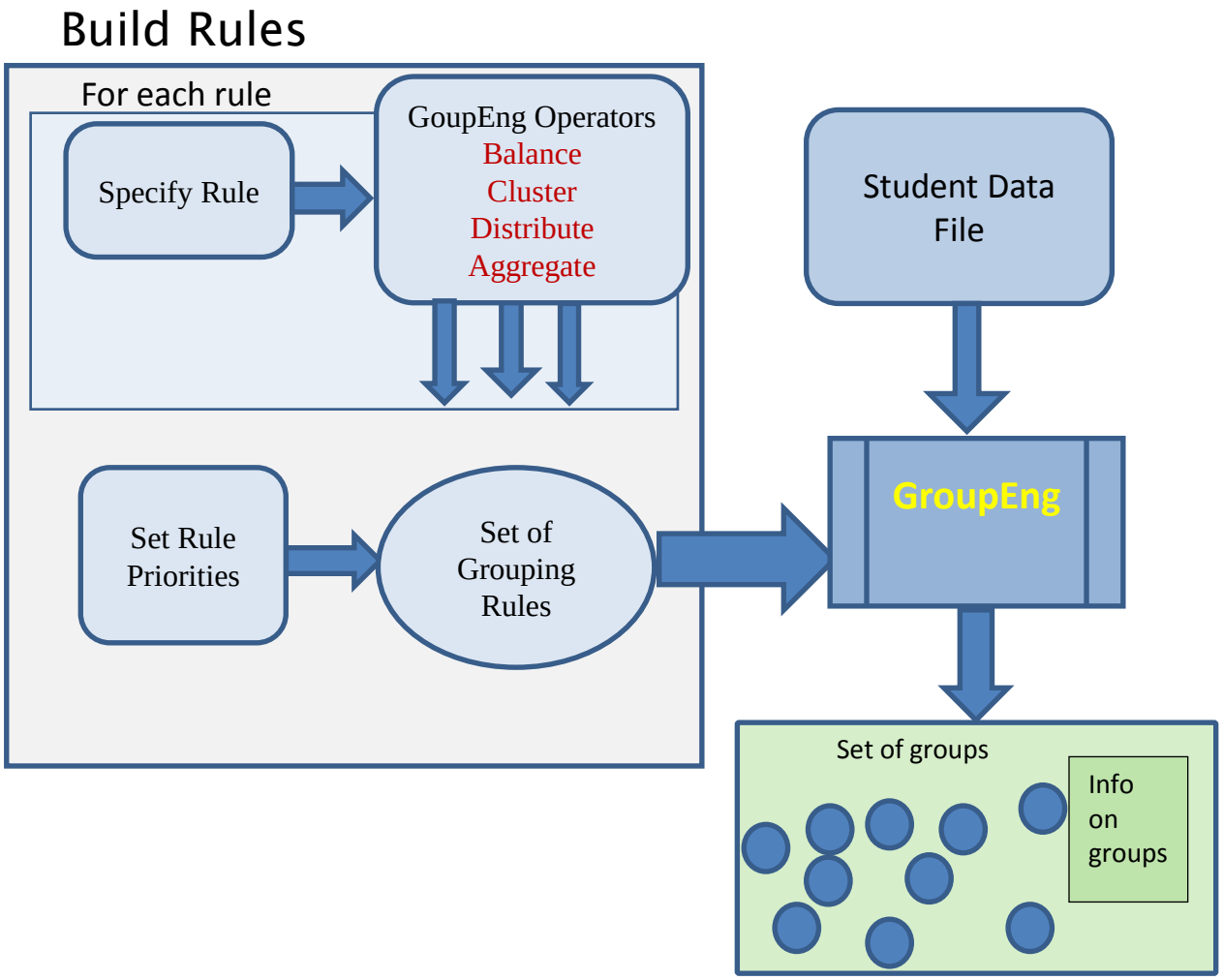
1. List rules for assigning groups in your class
2. Prioritize the rules
3. Identify the operand for each rule using one of

   cluster
   distribute
   aggregate
   Balance

4. Rewrite each rule as an operand and an attribute category


Rule
s
Input
Deck
Student Data
File
pEng Program
Unmet rules Met rules
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Output

Using GroupEng



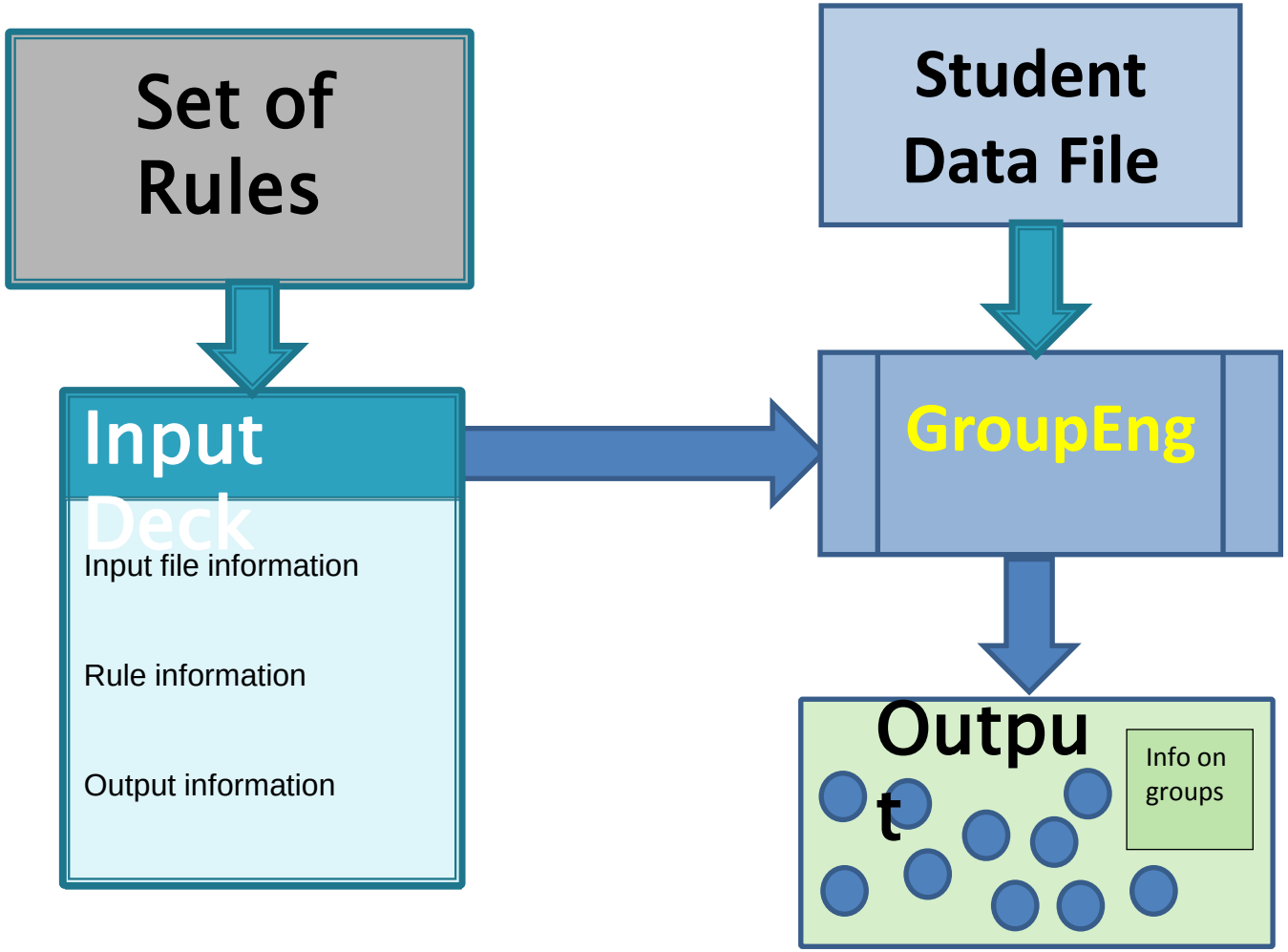
Efficiently Assign Student Groups Using GroupEng

Thomas Dimiduk, Harvard University
Kathryn Dimiduk, Cornell University

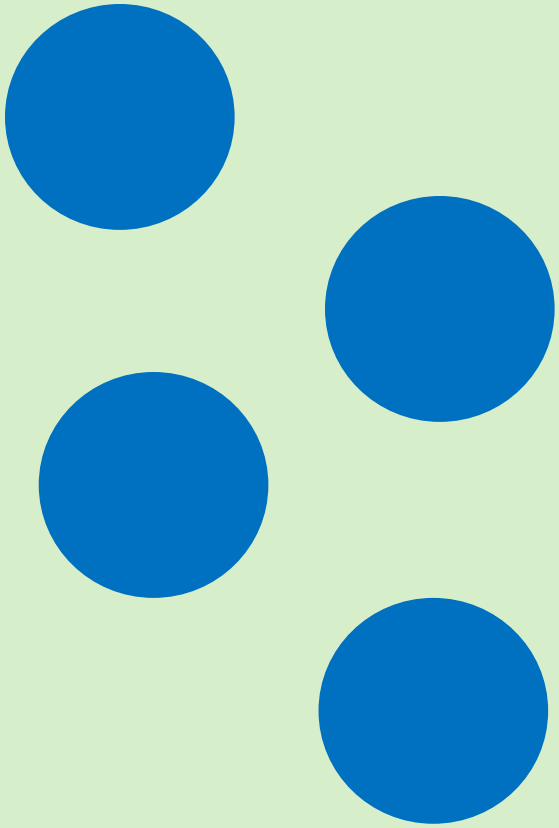
Make Your Own Groups – Experiment with Grouping Rules

- www.GroupEng.org
- Source code and instructions

GroupEng Program



Student groups output



Groups Overall

Failures for each rule

If a balance rule

- Class strength mean
- Class strength st. dev.
- Group strength st dev.

Each group

Members

Ave strength

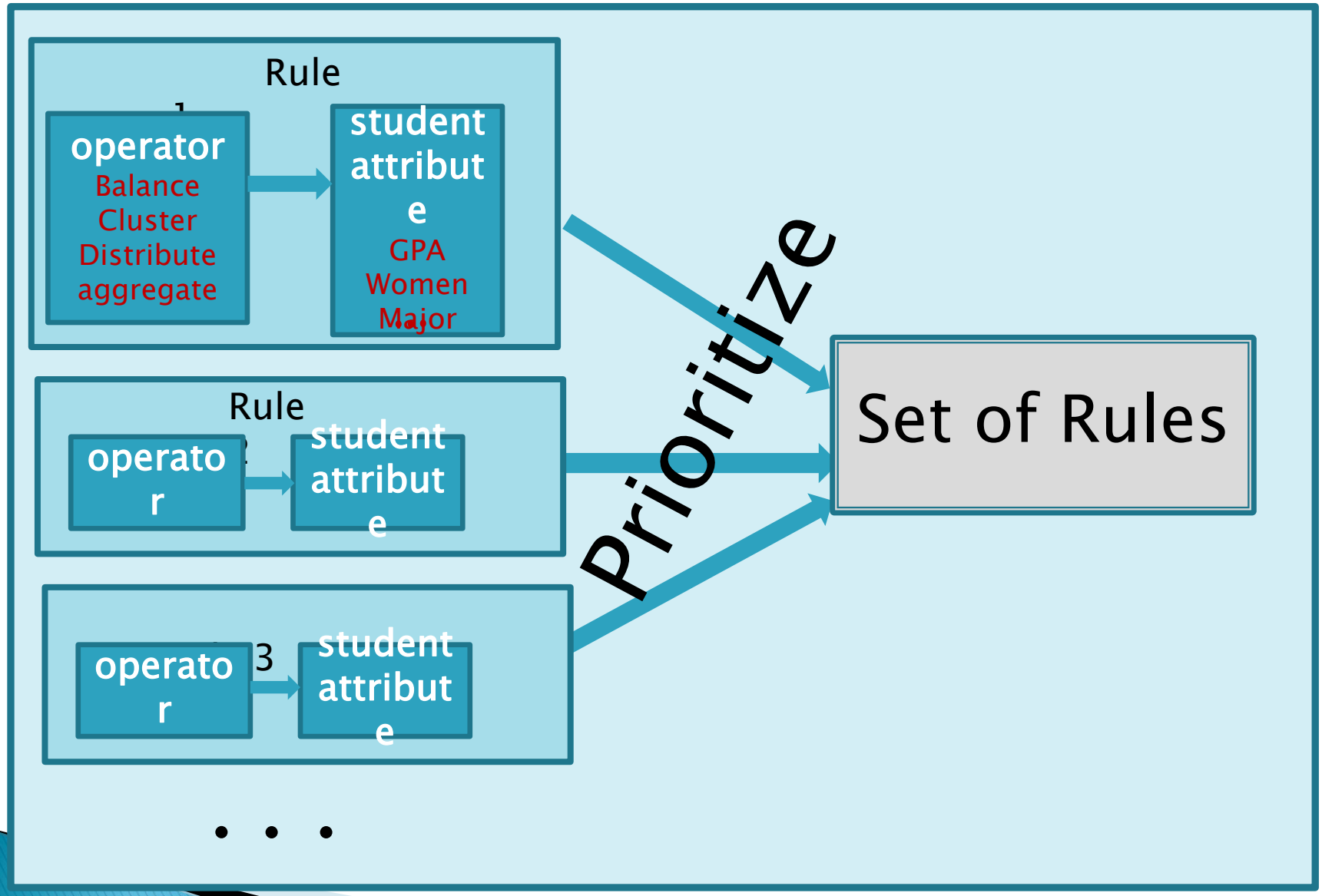
Broken rules?

Assigning Groups by Hand is Hard

By Hand

- Sort and Filter in Excel
- Partially meet a few criteria
- Good group selection takes hours
- Faculty don’t have the time

Define a Set of Grouping Rules



Group Composition Affects Retention and Learning

- ABET encourages teamwork
- Education research recommends assigning groups rather than self-selecting
- Multiple research based selection criteria
  - Don’t isolate women
  - Don’t isolate minorities
  - Mixed ability groups
  - Interdisciplinary groups
  - ……