

Reading Group Scheduler

By Evan DePosit

Introduction

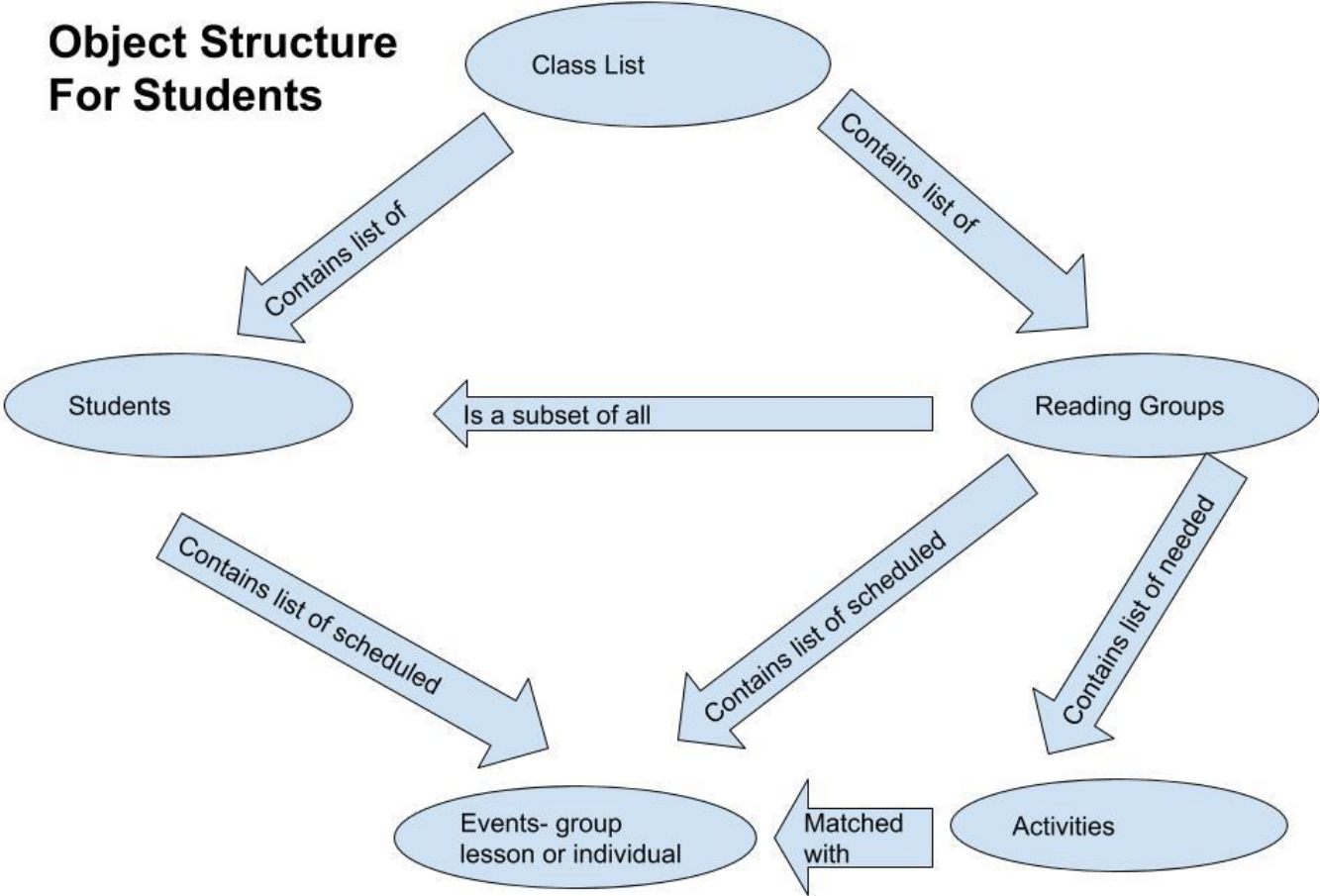
Goal

- While teacher is teaching a reading lesson to a small group of students, other students must rotate through individual reading activities.
- match groups of students with a teacher so that they can complete a reading group lesson
- match individual students with other reading activities when they are not engaged in a reading lesson.

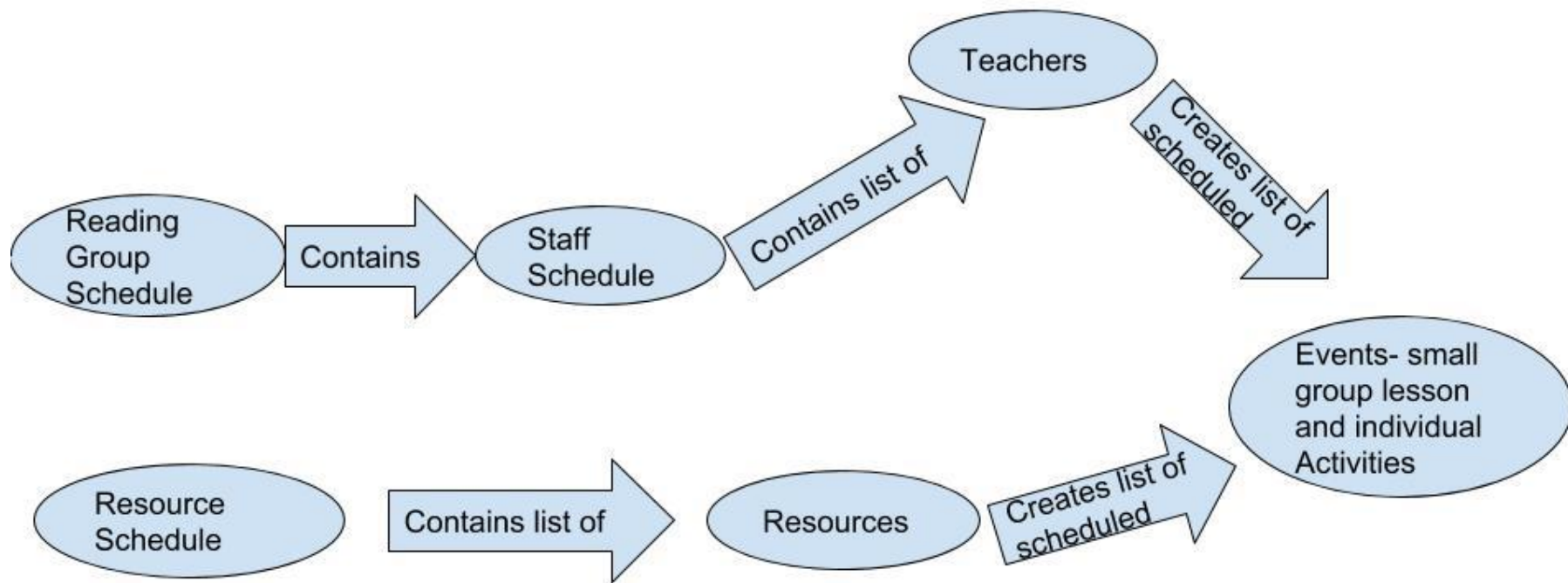
Requirements/Constraints

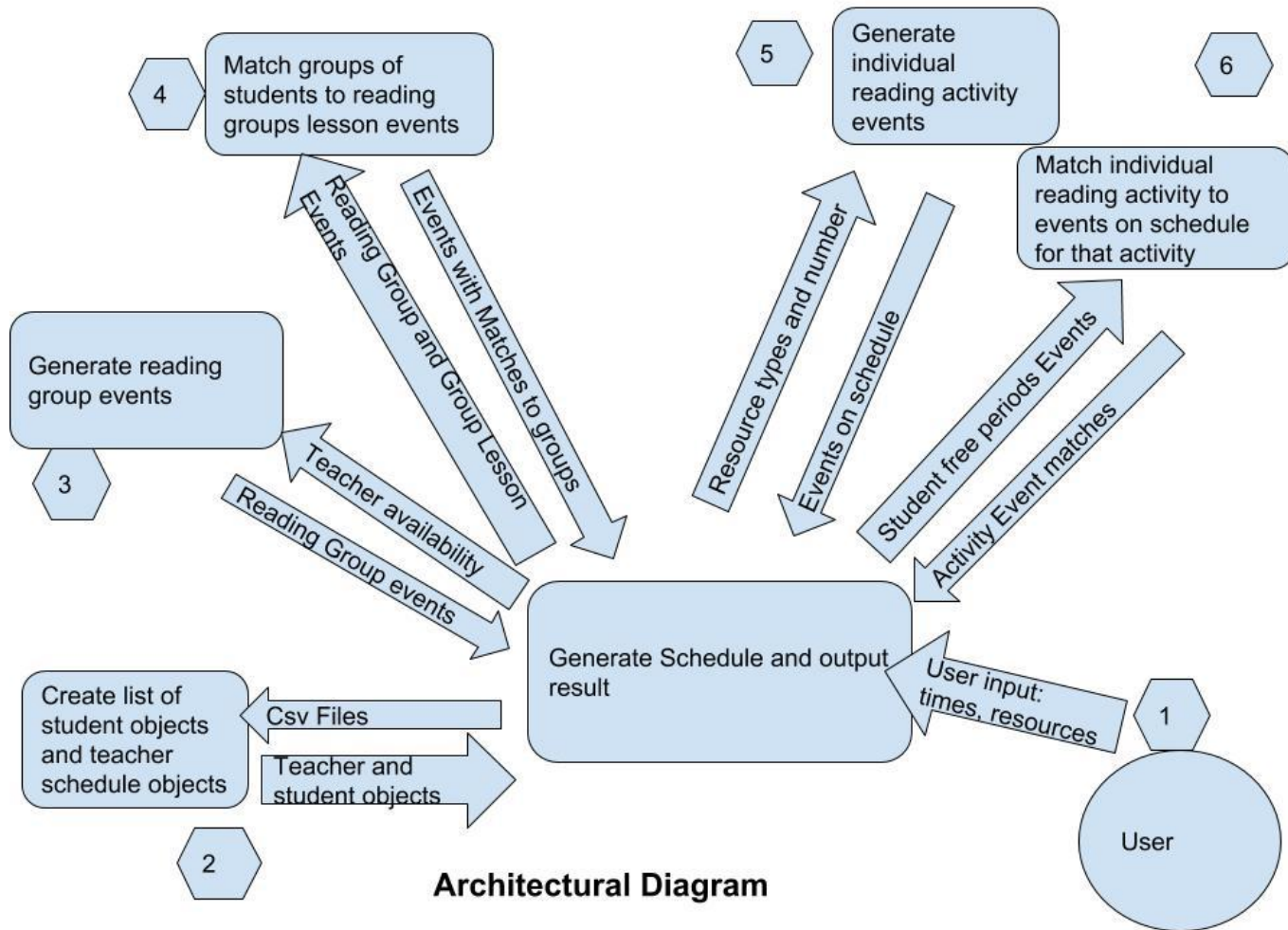
- Staff come in and out and cannot work with all groups
- Flexible creation of new reading activities
- Physical resources for reading activities are limited in quantity and may not be available at all times
- Students must always have a group lesson or other reading activity

Object Structure For Students

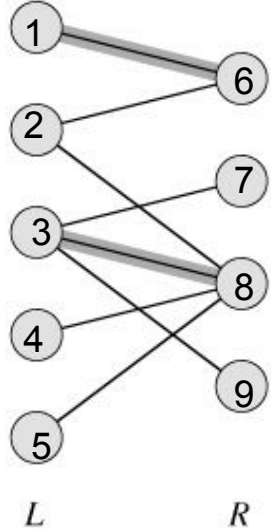


Object Structure for Staff Members and Resources

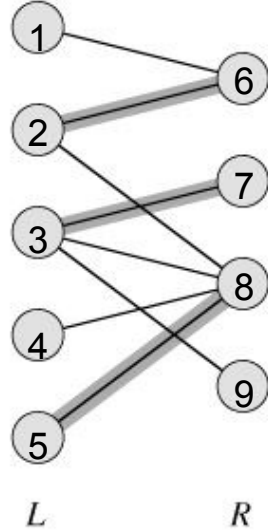




Maximum Matching in Bipartite Graphs

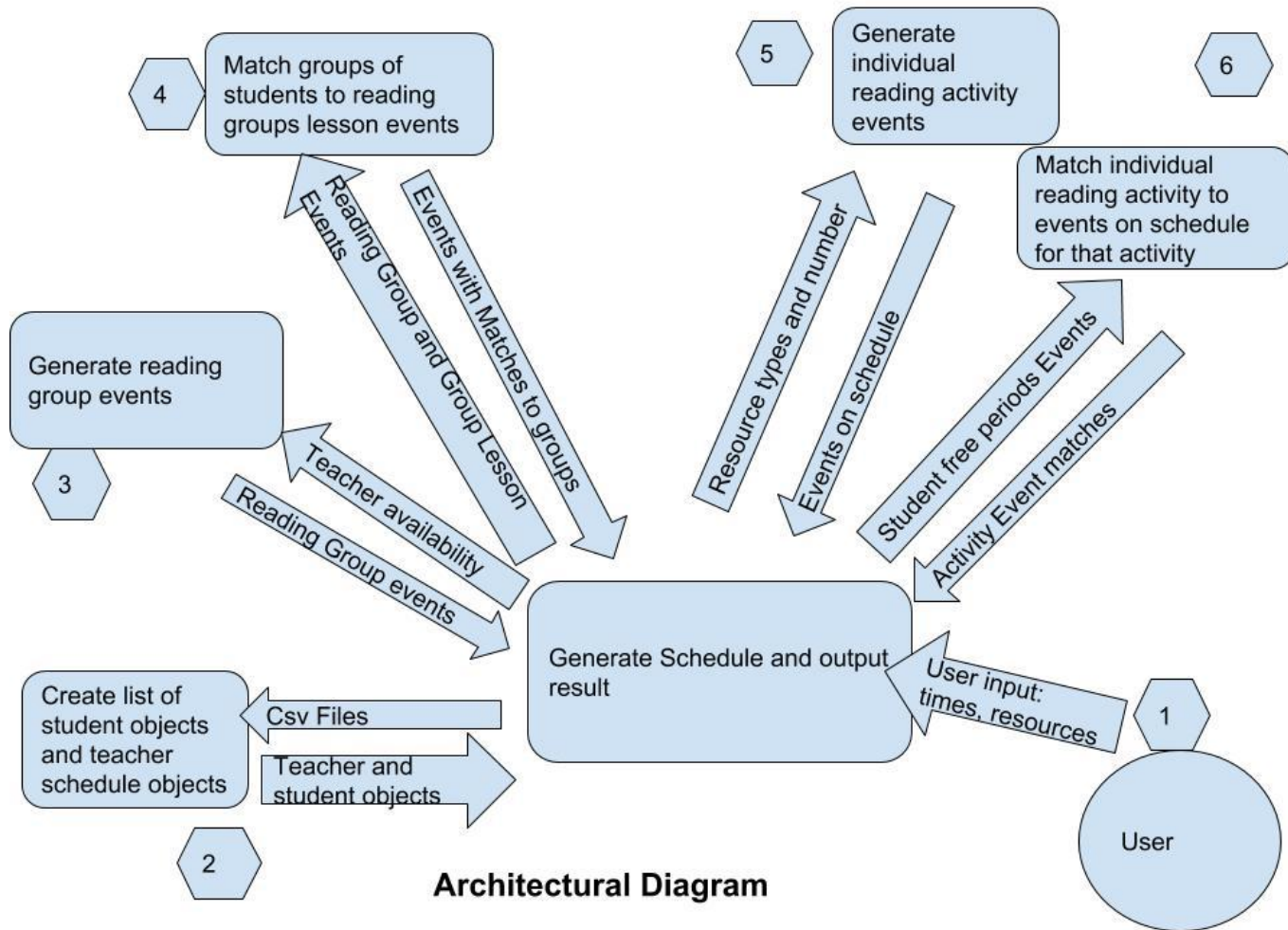


(a)



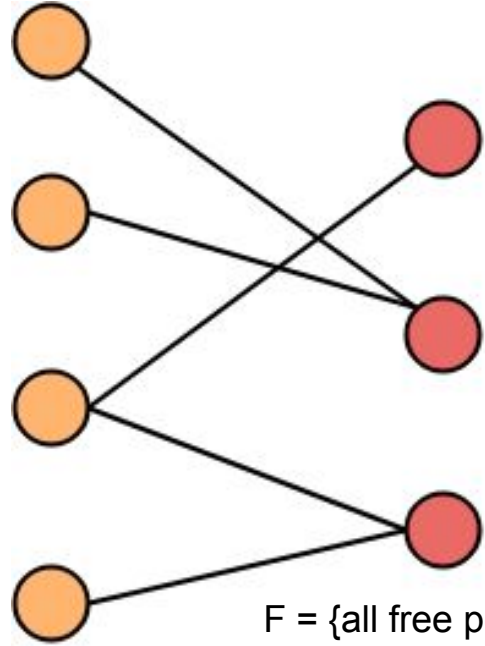
(b)

- Matches lessons Events to Reading Groups
- R is set of small group lesson Event objects taught by a Teacher, L is set of required group lessons for Reading Groups.
- Finds odd length path from free vertex in L to free vertex in R, such that odd edges are unmatched and even edges are matched
 - Example: 5----8■3----7
- When path is found, algorithm removes matches from even edges and adds matches to odd edges
 - Example: 5■8----3■7



DePosit's Matching Algorithm

$R = \{\text{all Events created by Resources}\}$



$F = \{\text{all free period Events}\}$

Chromatic Number = 2

- Match free periods in each student's schedule with a needed individual reading activity created by a resource
- Need to evenly distribute different reading activities to students
- Edges based on time and day.
- Weight of each edge is calculated as the $(\text{number of events of that type in student's schedule} / \text{number created}) * 100$
- For each free period in F , find activity with lowest weight in R
- Match, add to schedule, and remove both from sets.