

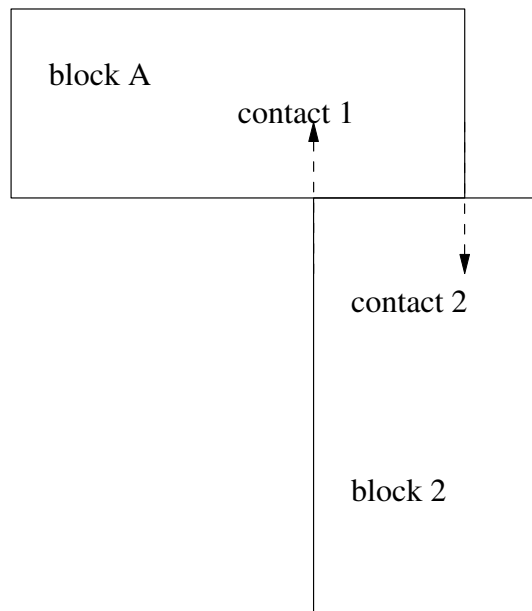
## Programming Proverbs

- 25 Consider another language
- 26 Don't be afraid to start over
- Henry F. Ledgard, “Programming Proverbs: Principles of Good Programming with Numerous Examples to Improve Programming Style and Proficiency”, (Hayden Computer Programming Series), Hayden Book Company, 1st edition, ISBN-13: 978-0810455221, December 1975.

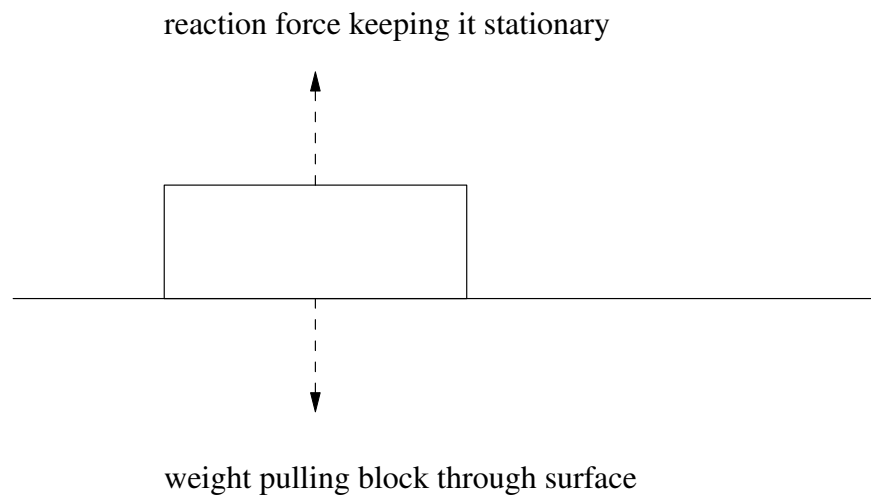
## Contact resolution

- so far in PGE we have looked at collision prediction and collision response
- we notice that while this works well when objects are moving it *breaks* when objects come to rest
  - as objects often interpenetrate

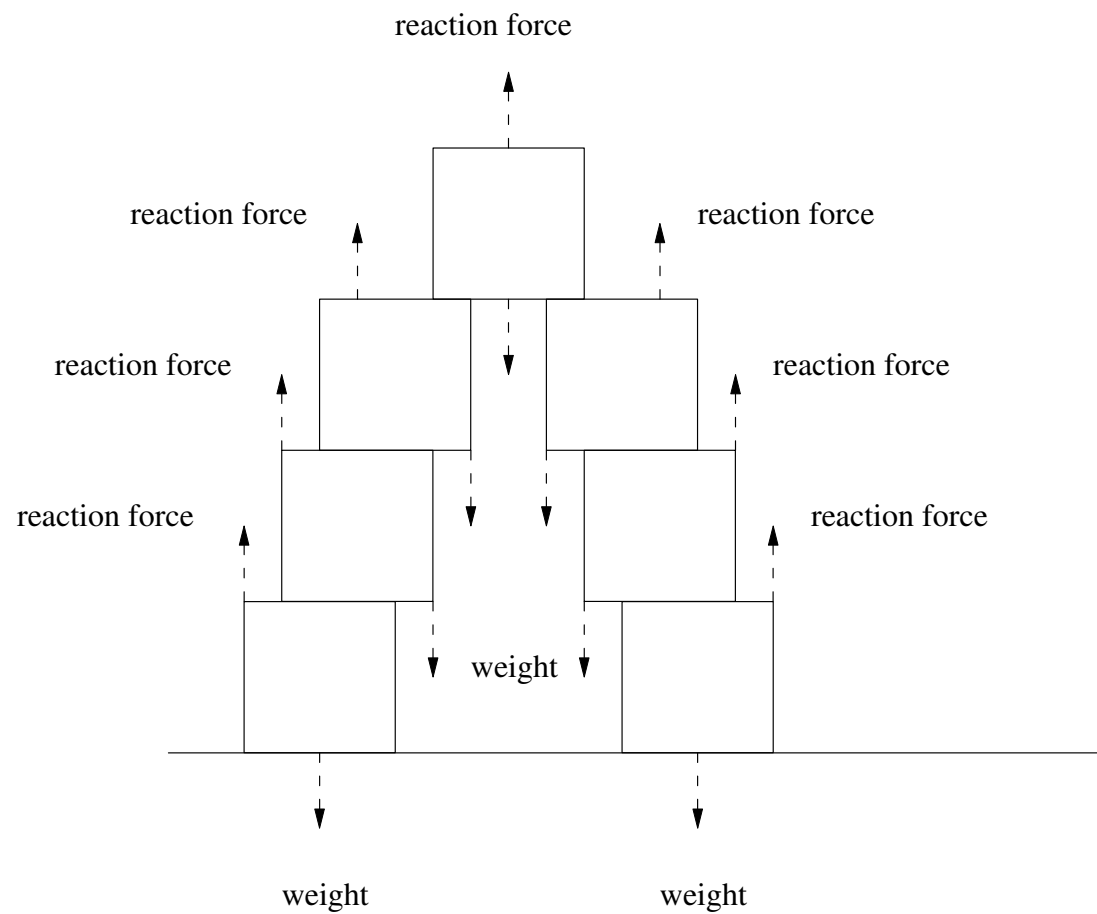
# Consider various contact problems: simultaneous contacts



# Consider various contact problems: object at rest



# Consider various contact problems: multiple stacked objects at rest




## Resolution order

- if an object has two simultaneous contacts then
- changing one of the contacts by reversing its velocity, as a reaction, might also change the reaction of the other
  - as the object moves appart
  - or it might not be enough as the other contact velocity might be larger
- to avoid this situation we resolve the most severe contact first

## Resolution order

- another problem might be that resolving the second contact puts the first contact back into conflict
- fortunately it can be shown that non friction cases the looping will eventually settle to the correct answer
  - it will also work for certain friction cases

## Contact resolver algorithm



```
repeat
  calculate the separating velocity of each contact, keeping track
    of the contact with the lowest value

  if the lowest separating velocity is greater than or equal to zero
  then
    return
  else
    process the collision response algorithm for the contact with
      the lowest separating velocity (most negative)
  fi
until max iterations have occurred
```



## Contact resolver algorithm

- max number of iterations must be  $\geq$  of contacts
  - so that they all have a chance of being processed once