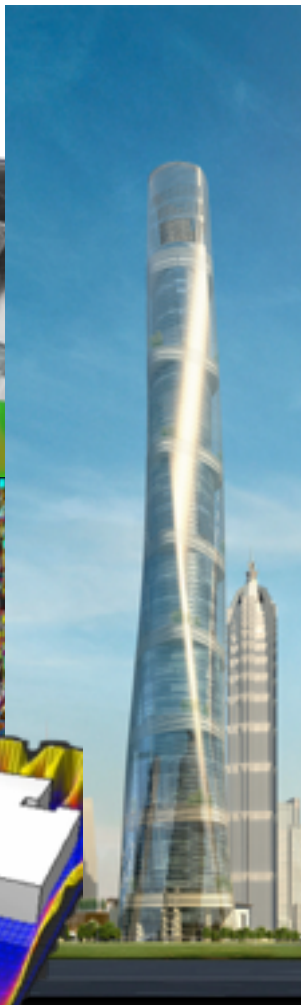
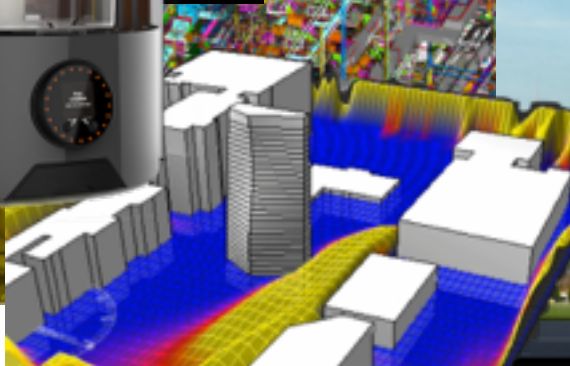
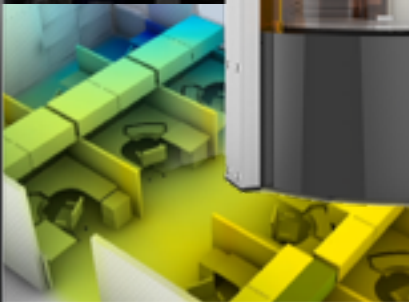
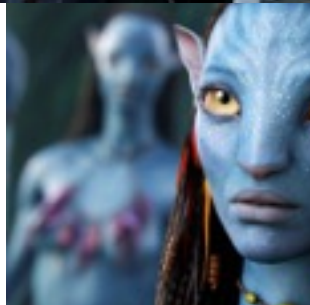
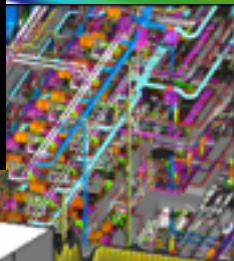
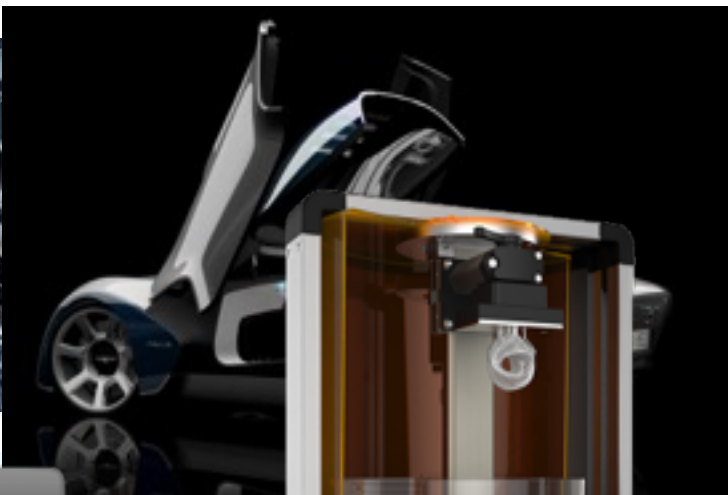


A vertical photograph of the Golden Gate Bridge, showing its iconic orange-red towers and suspension cables against a hazy sky and water.

Building the Autodesk Design Graph using Apache Spark

Yotto Koga







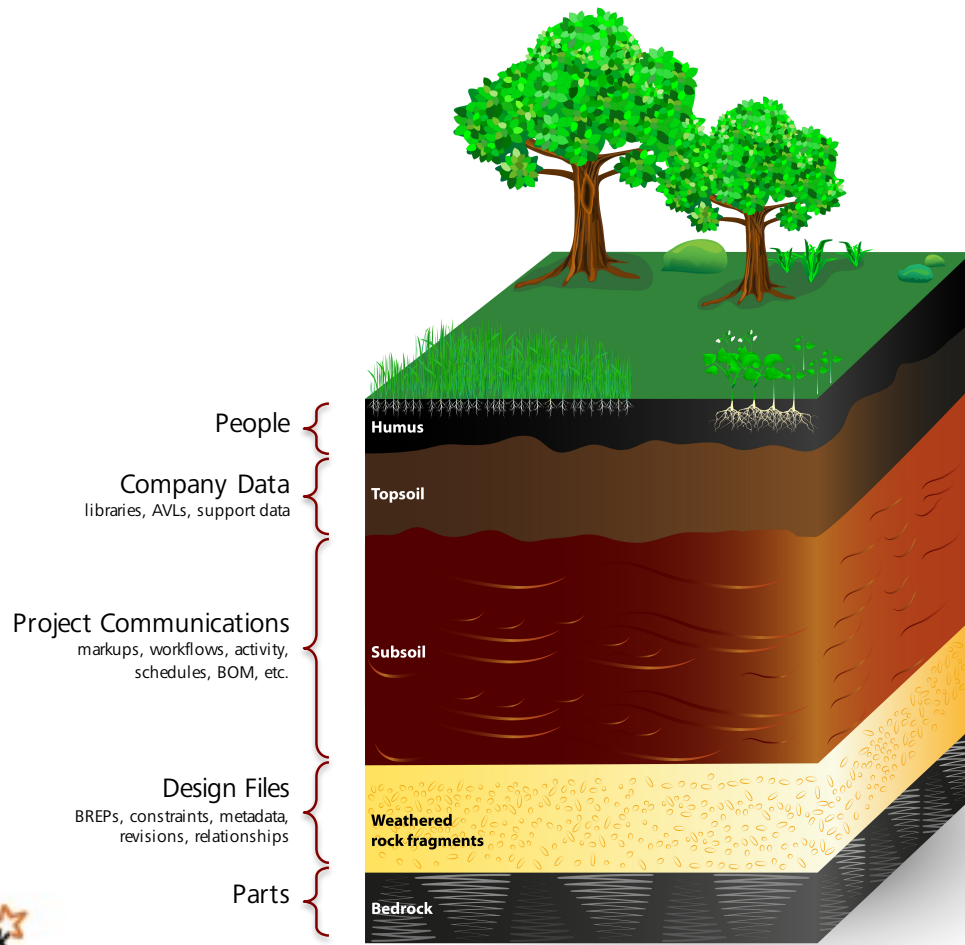
I can...

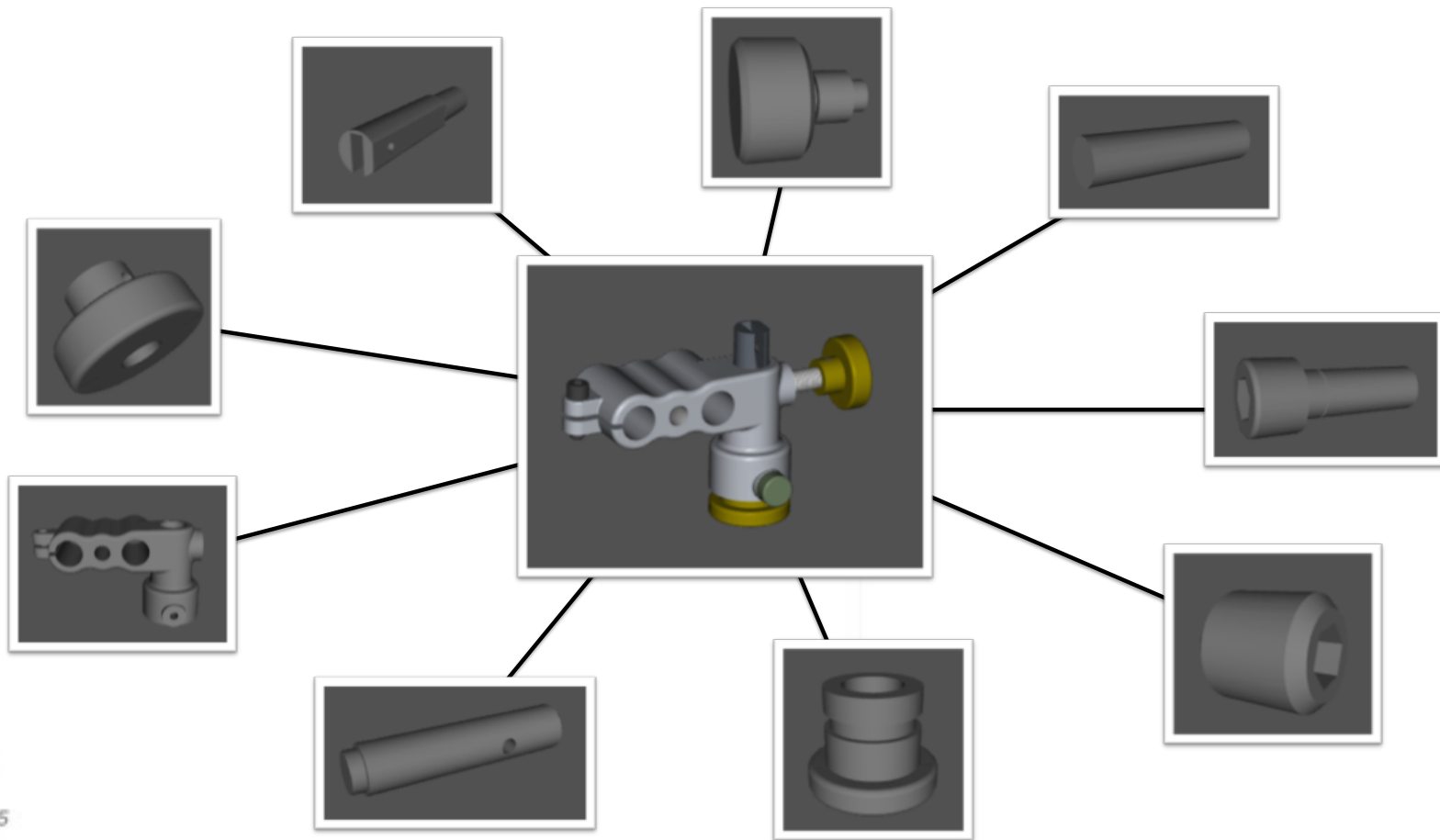
- focus on the solution
- catch problems early
- gain insights

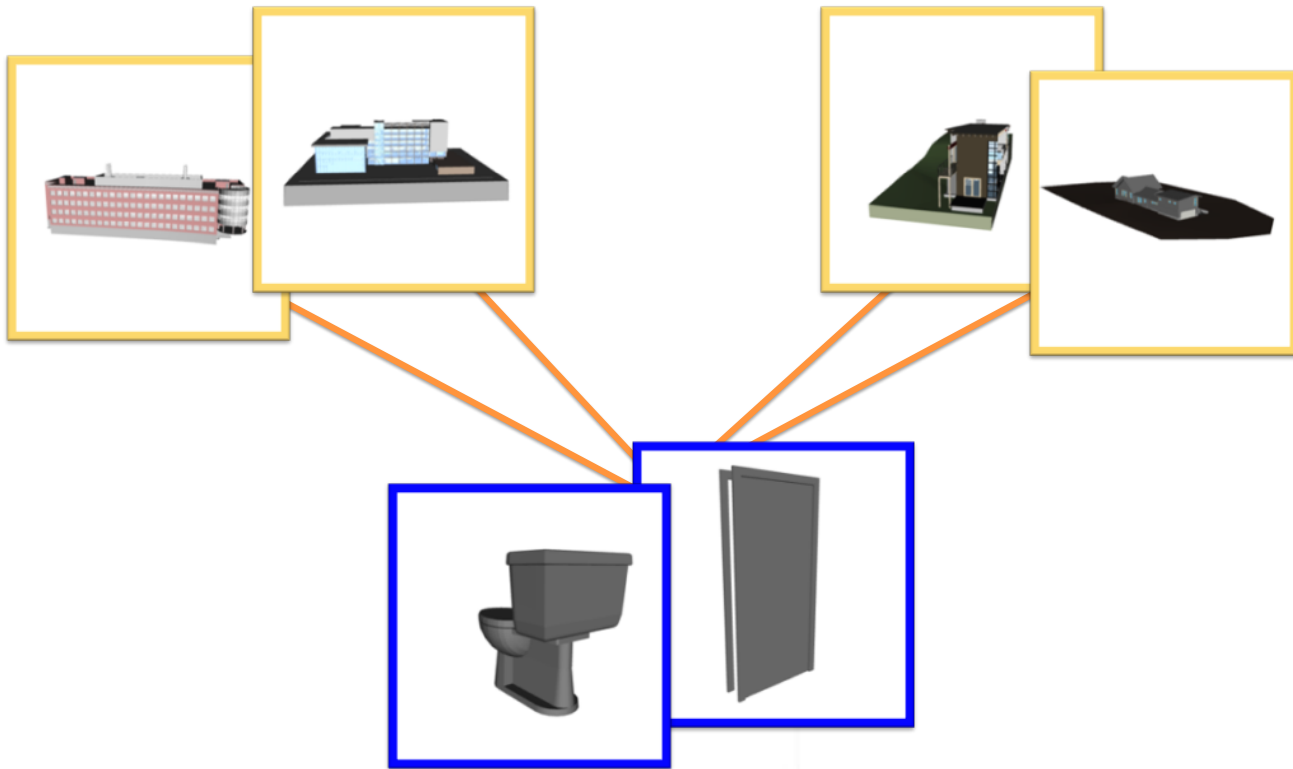


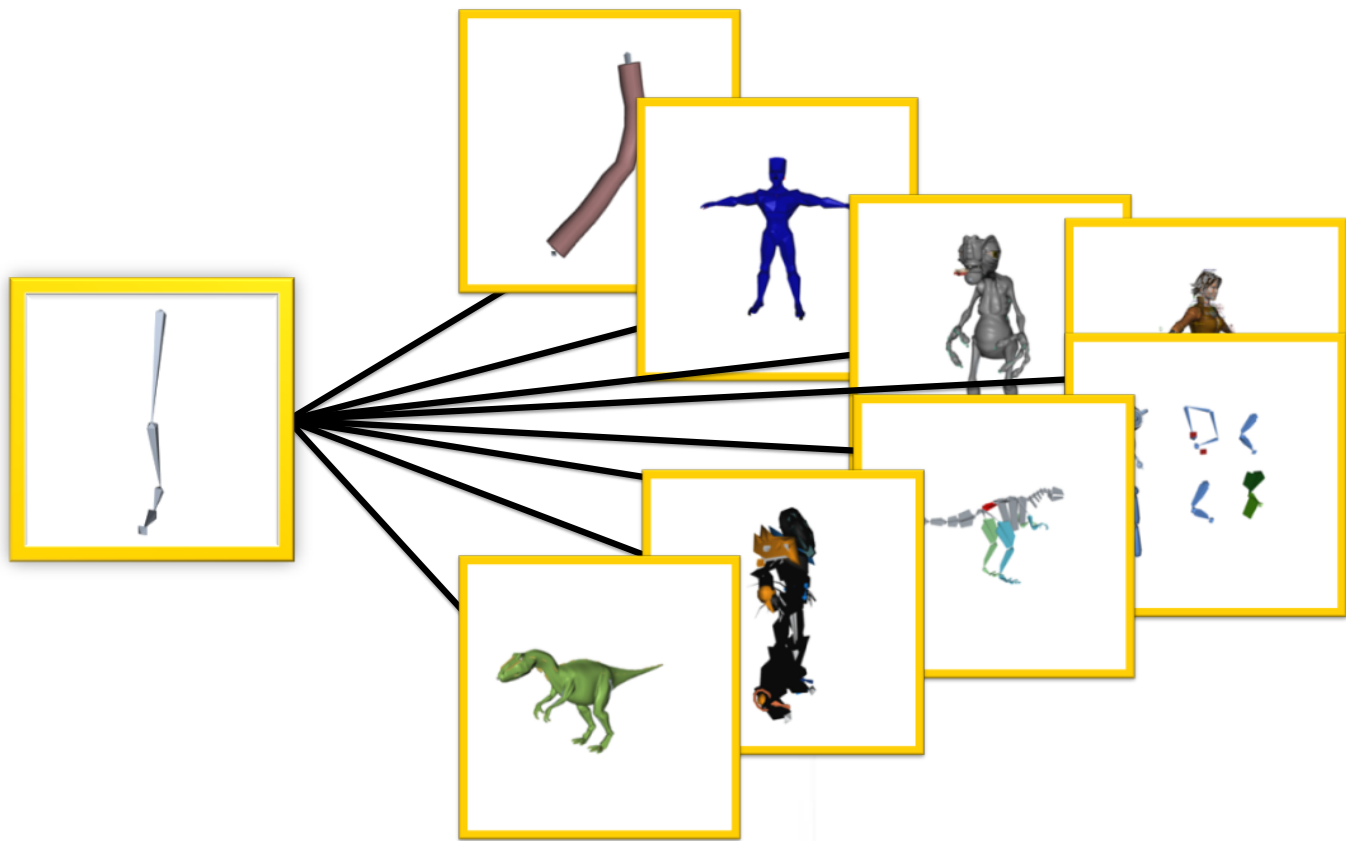
[martingrandjean](#)

Where to start?

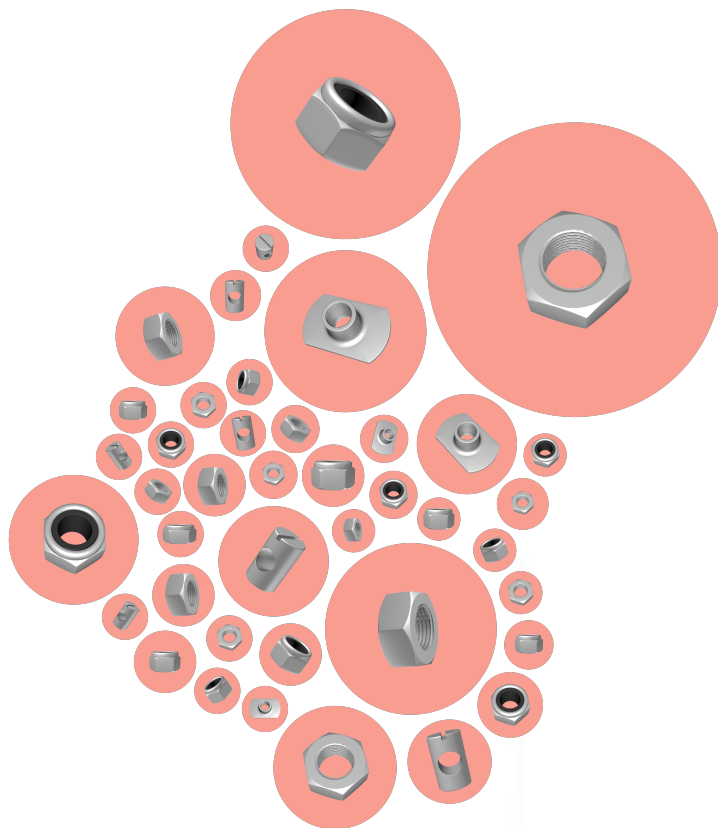




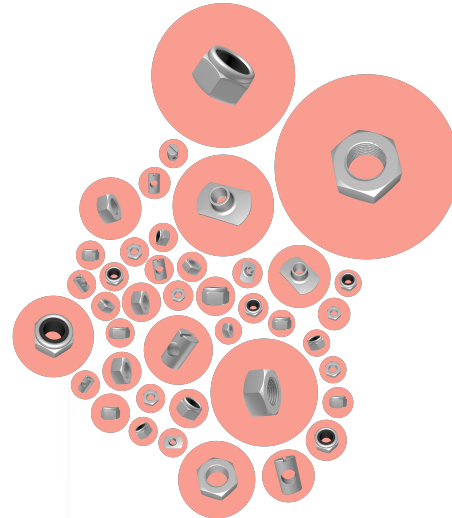
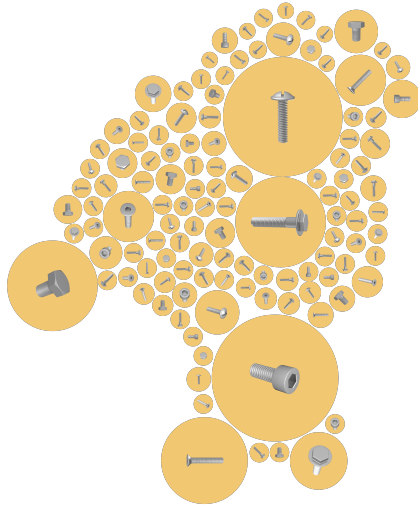




Parts ~ Words

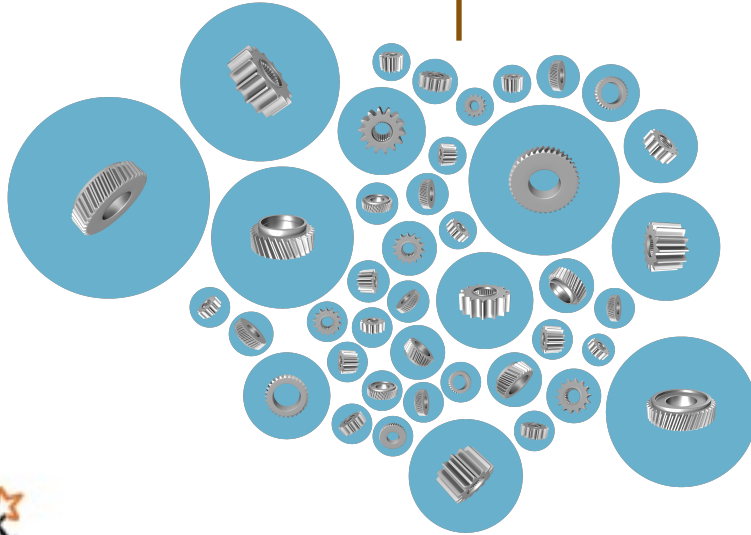


Fasteners

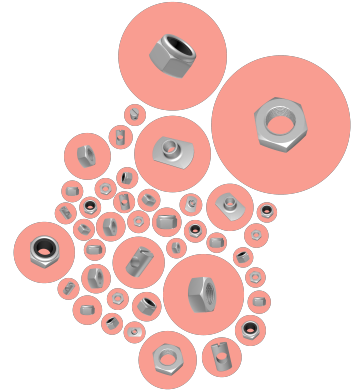
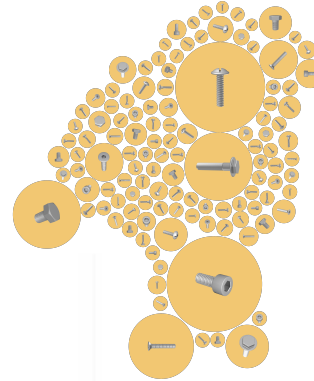


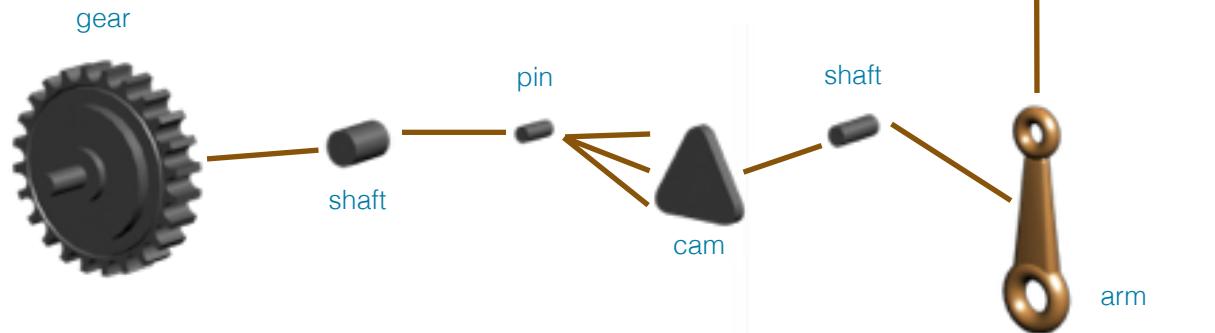


Power Transmission

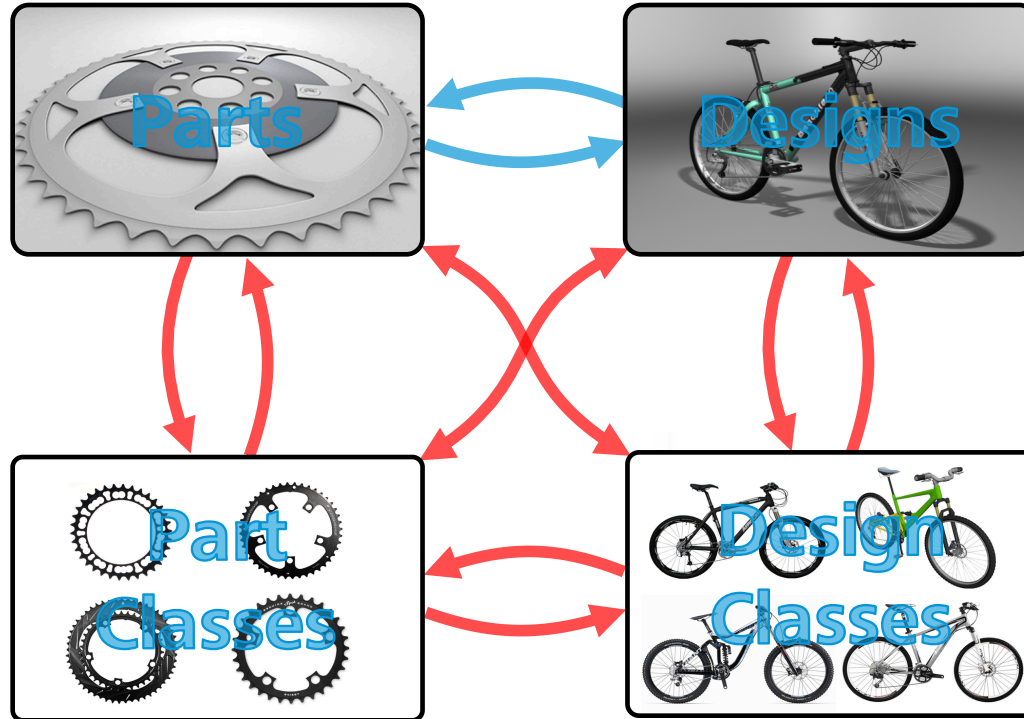


Fasteners





Initial Design Graph



How do we identify parts?



Material	Type 316 Stainless Steel
Thread Size	1/4"-20
Head Width	7/16"
Head Height	5/32"
Length	1/2"
Thread Length	Full
RoHS	Compliant

Made from stainless steel, these screws are corrosion resistant in harsh environments. They may be mildly magnetic. Length is measured from under the head.

Inch screws have a minimum tensile strength of 70,000 psi, a Class 2A thread fit, and a minimum Rockwell hardness of B70. Dimensions meet ASME B18.2.1. For screws in sizes 4-40 to 12-24, see [hex-head machine screws](#).

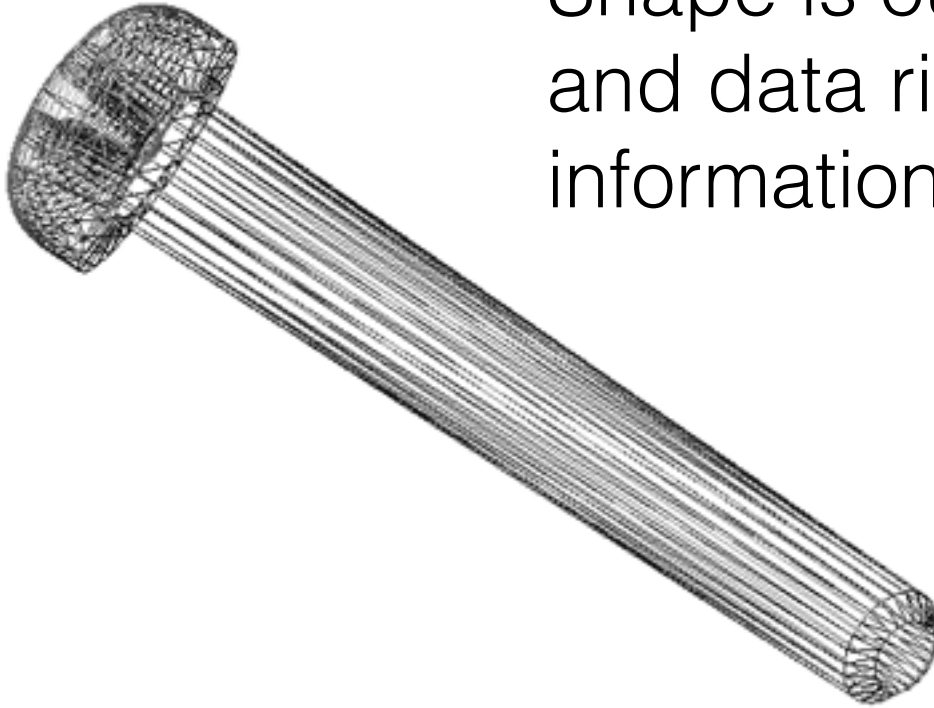
Type 316 Stainless Steel—Screws are more corrosion resistant than 18-8 stainless steel screws and can be used in marine environments.

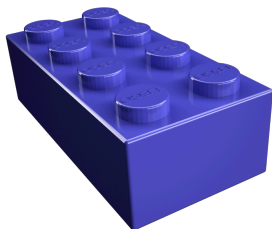
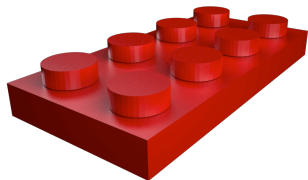
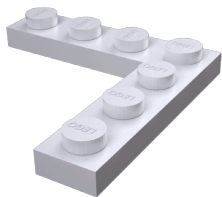


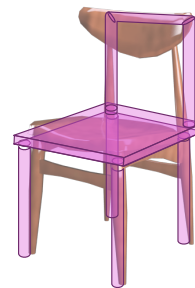
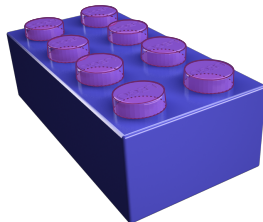
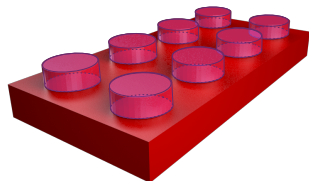
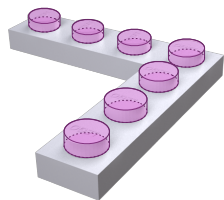
PK46.21.02 (8) 60021-774:6 575022-A018:2 ASME B16 (7)
KHZ-122 770125XX
DIN916_M4X4 AA05KJB
ISO 21.3x2
20544-PIN ANSI b18.2.4.4m XX001-RS1-MP1937
1_2-1.5-UNC DIN985_M3
ASME B16 (2) prt0006 P50036LA
L4X4X1/4 BLT8C06-28 PK46.51.11.021
PK46.21.02.052:1 JGyr6kXwTUi_APxvkFu8Zg
ISO 4032 M16:1 MM-091 Box1:1
ANSI 14x14x1_2 00000253

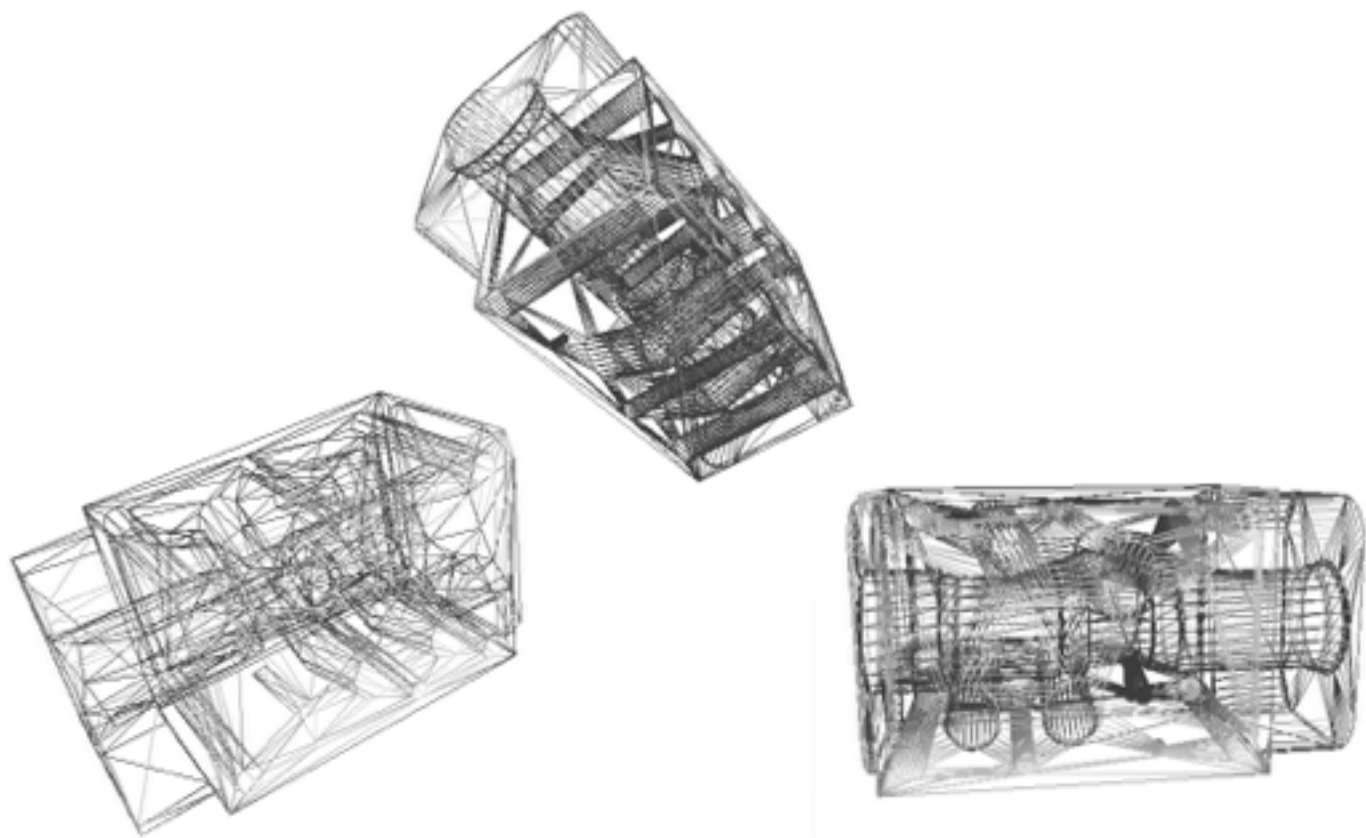


Shape is our most reliable
and data rich piece of
information

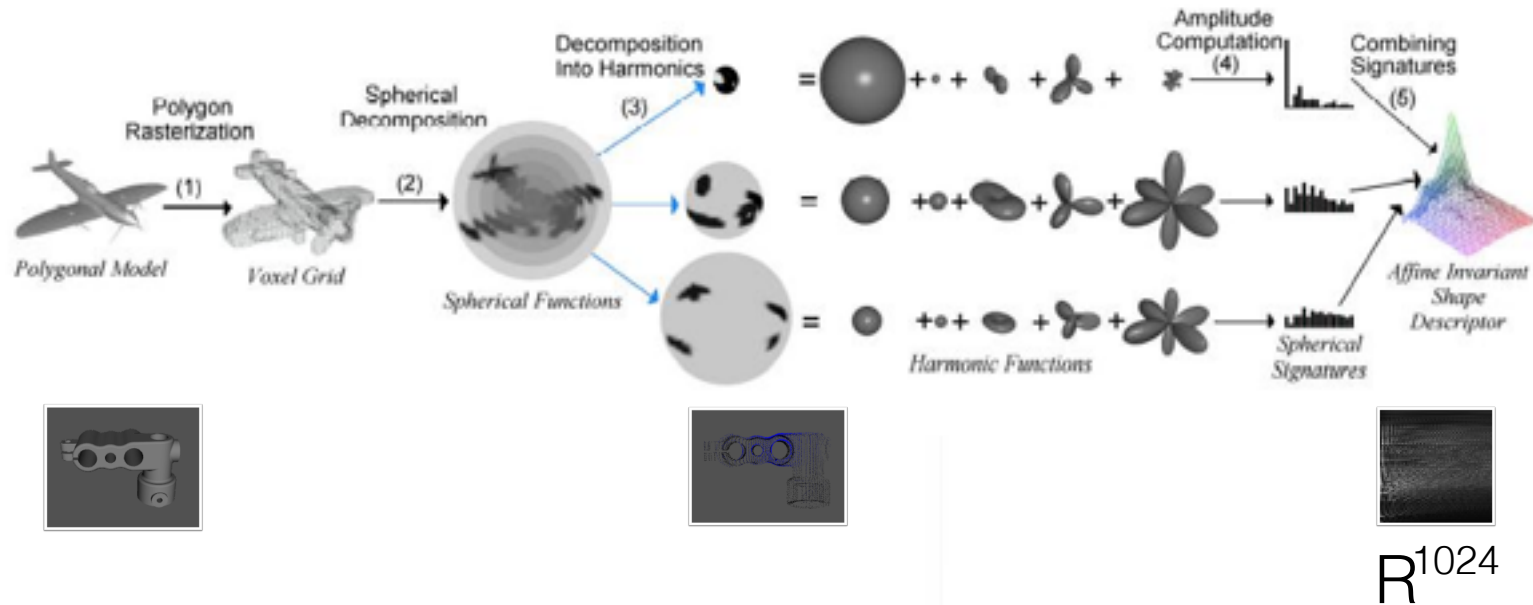






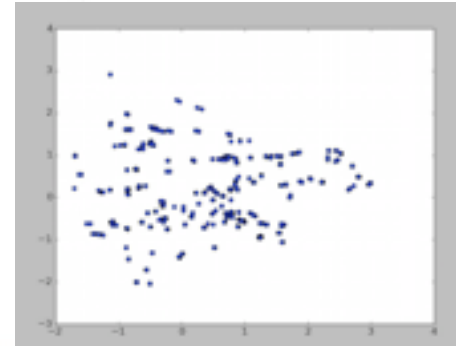
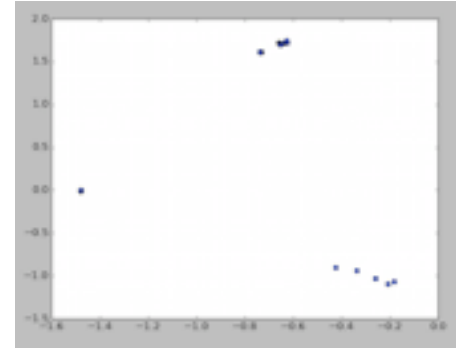
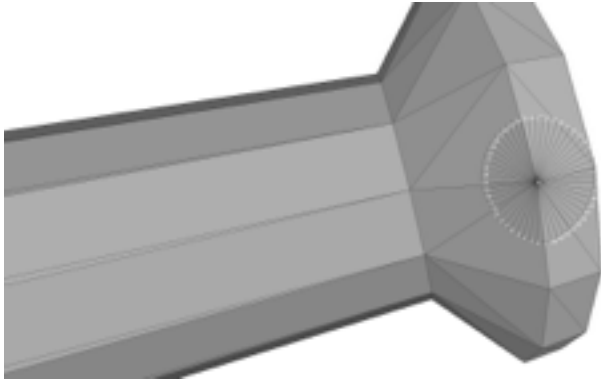


Spherical Harmonic Shape Descriptor

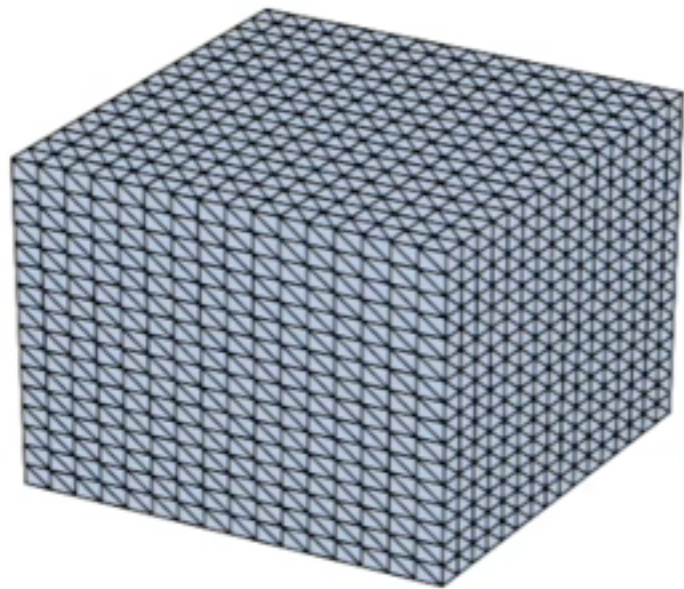


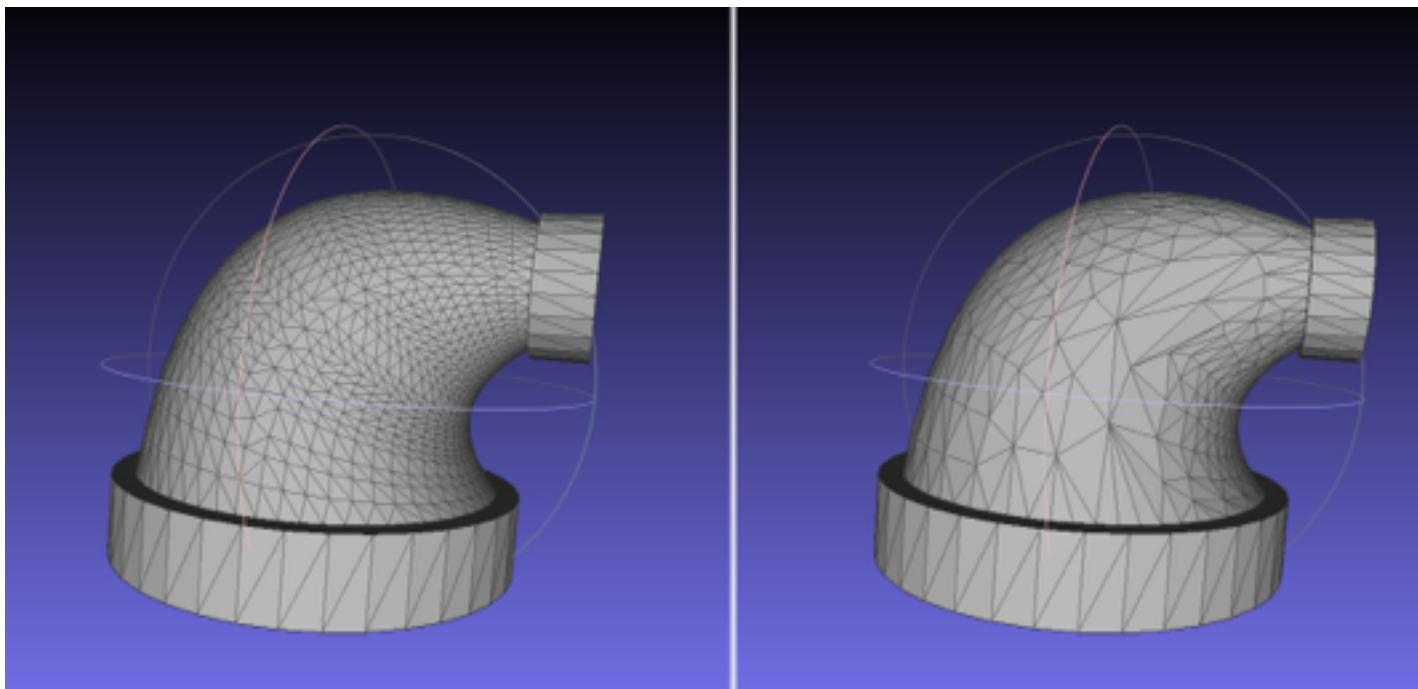
M. Kazhdan et al, "Rotation Invariant Spherical Harmonic Representation of 3D Shape Descriptors"

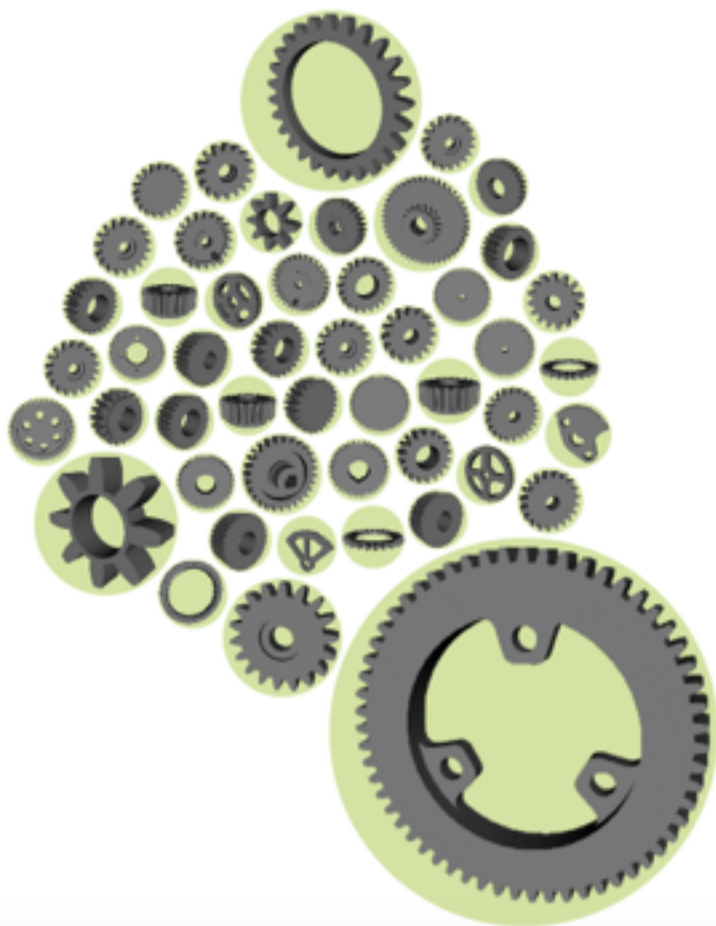
Bigram Shape Descriptor

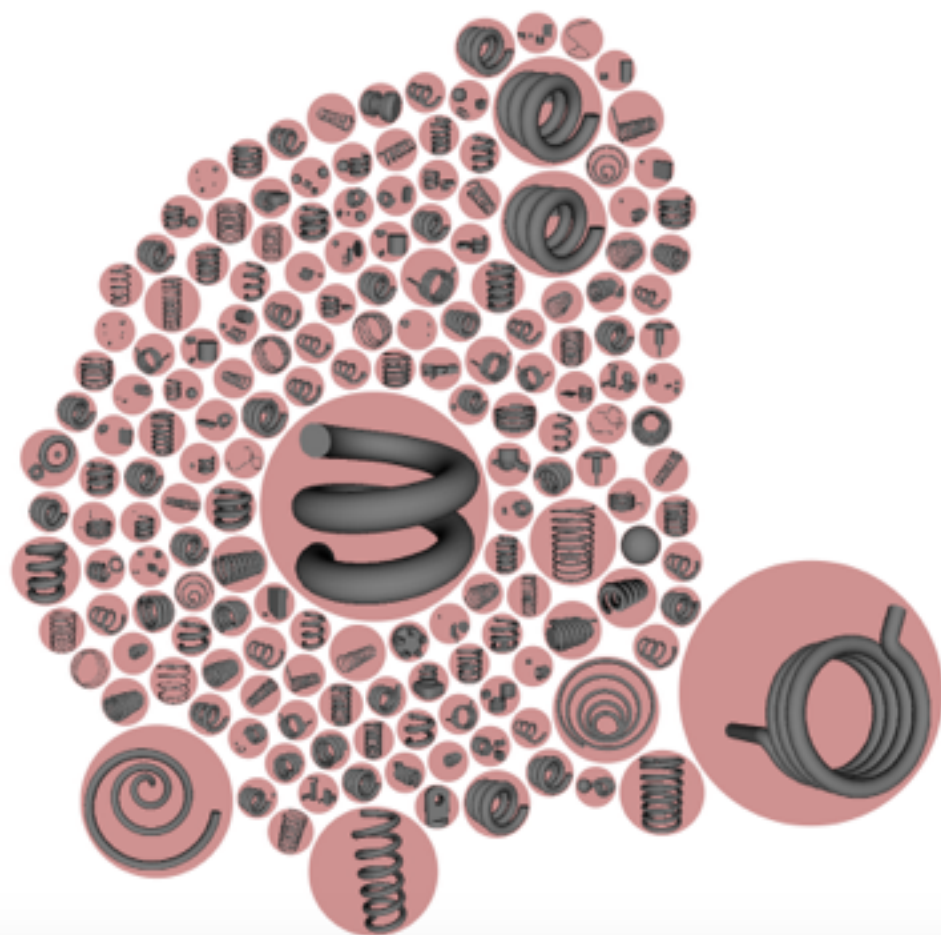


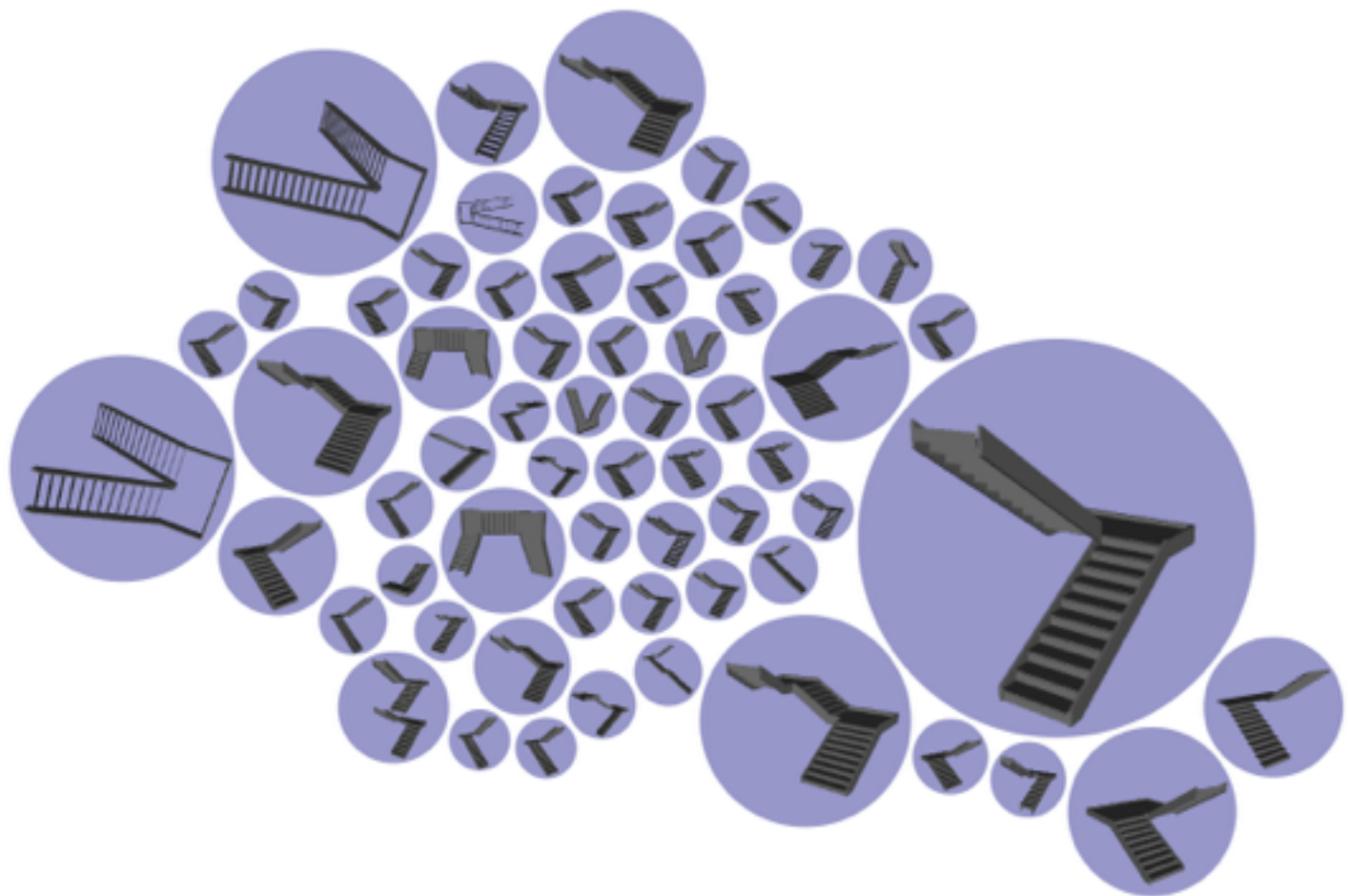
R^{4110}

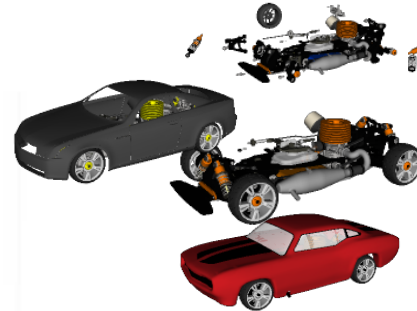
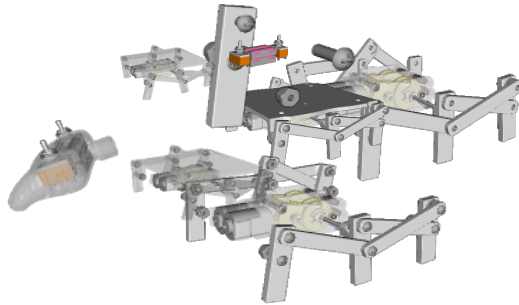
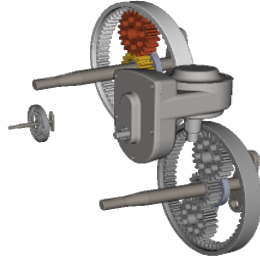


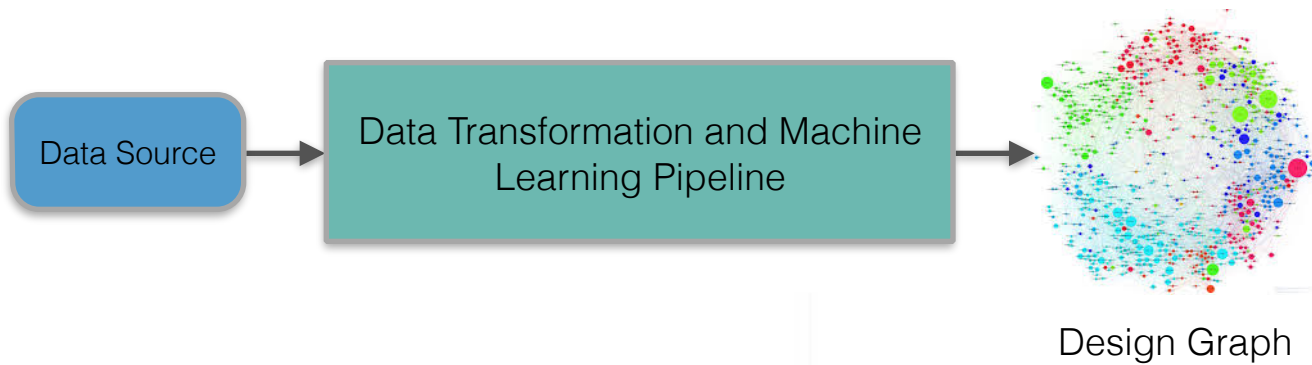


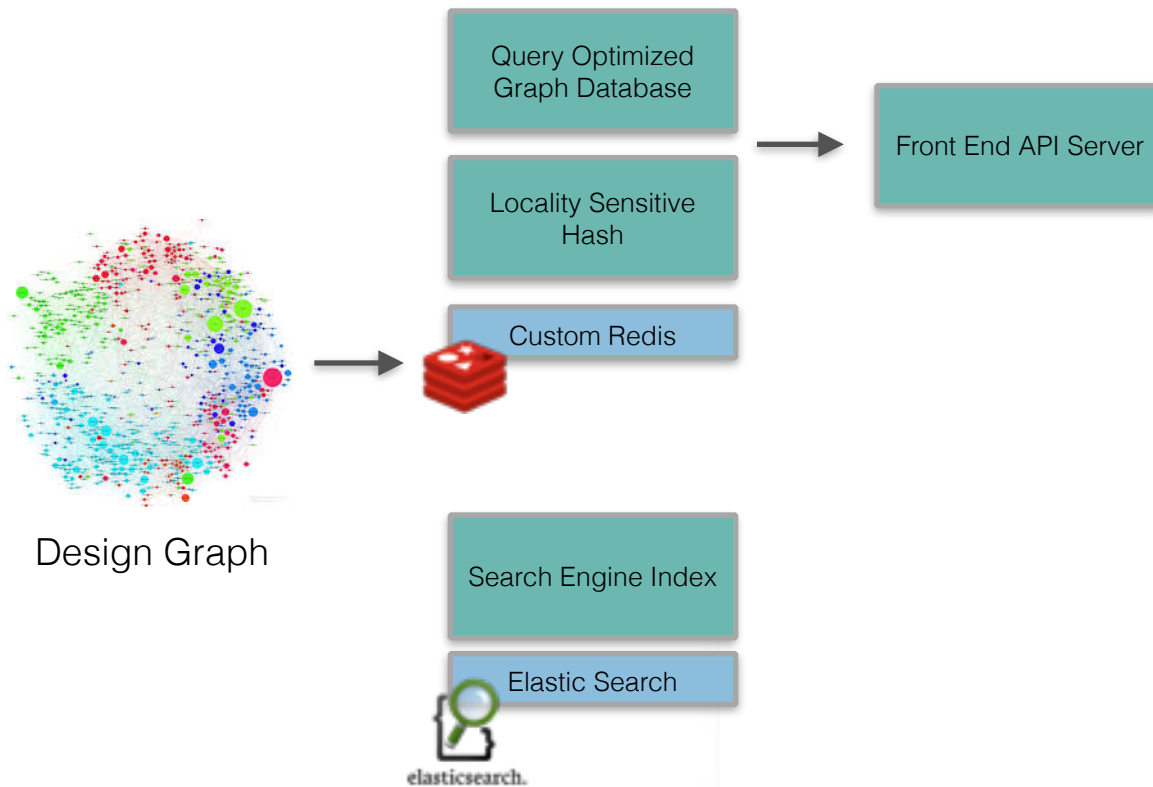


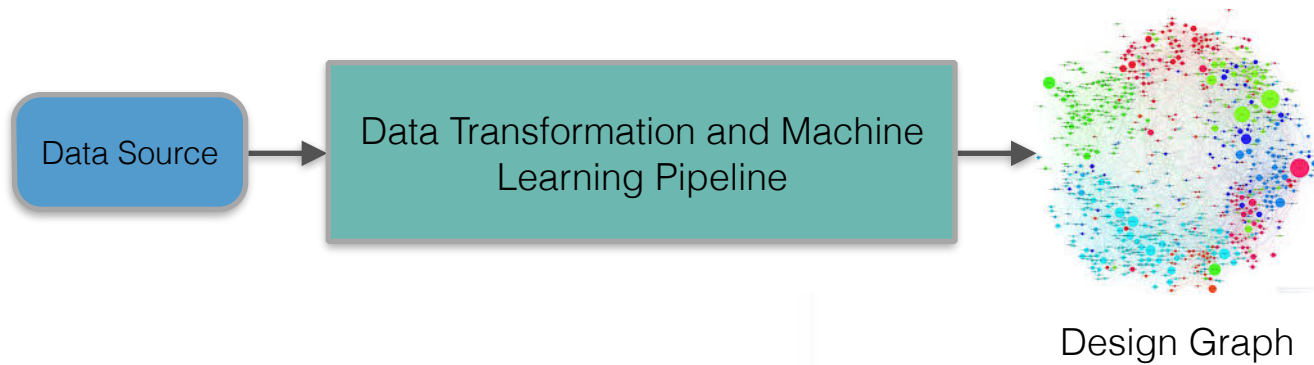


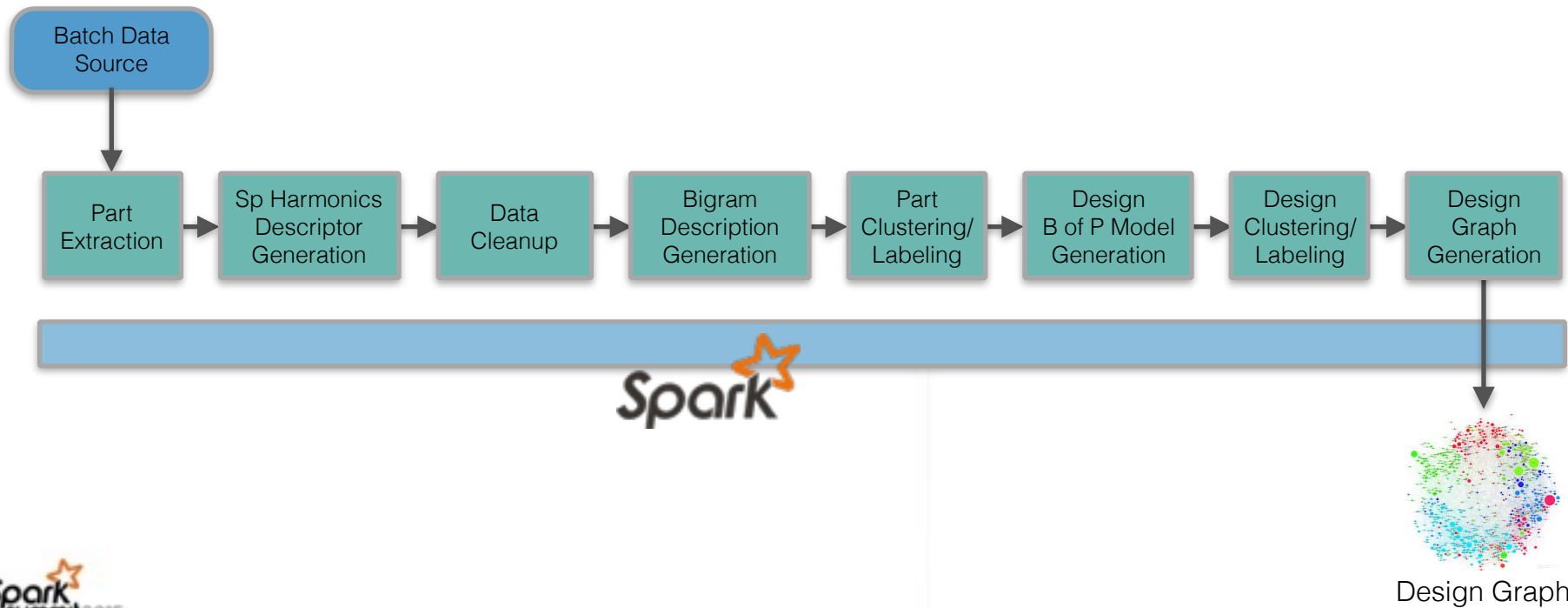














Mesh Processing C++

Mesh Processing C++





Input RDD

Mesh Processing
C++

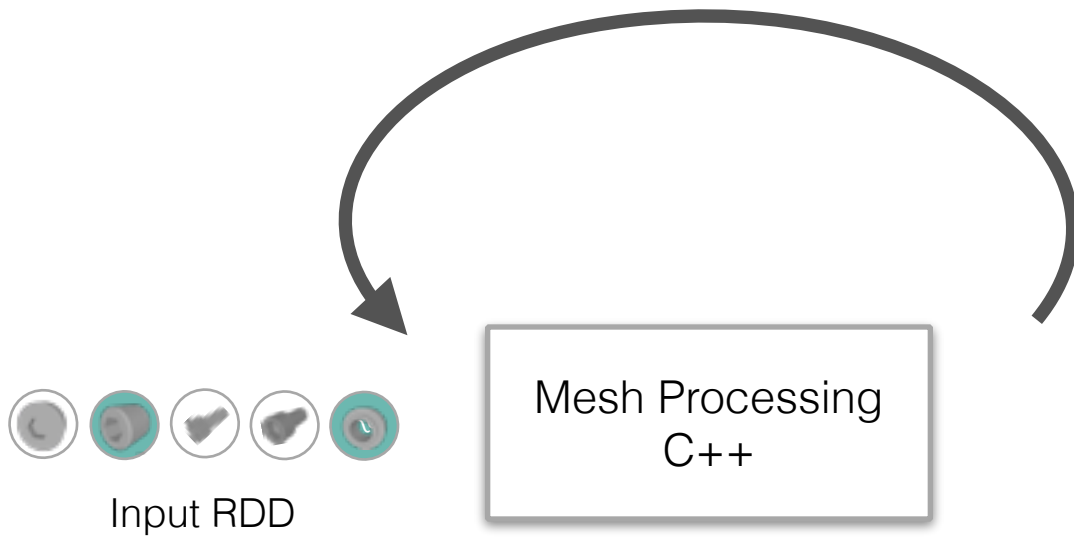
RDD Transform (Batch)

Mesh Processing
C++



Output RDD

RDD Transform (Batch)



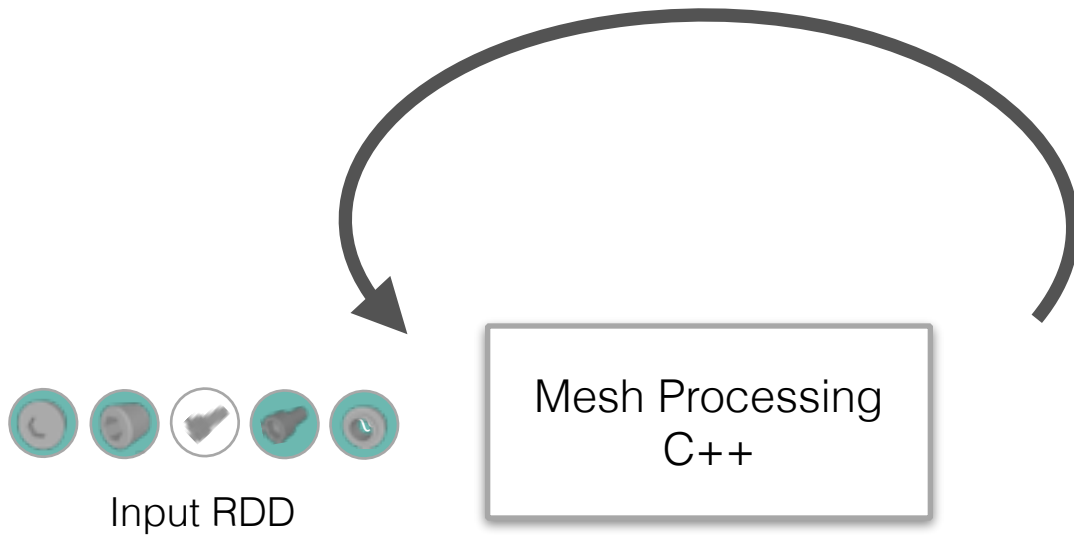
RDD Transform (Batch)

Mesh Processing
C++



Output RDD

RDD Transform (Batch)



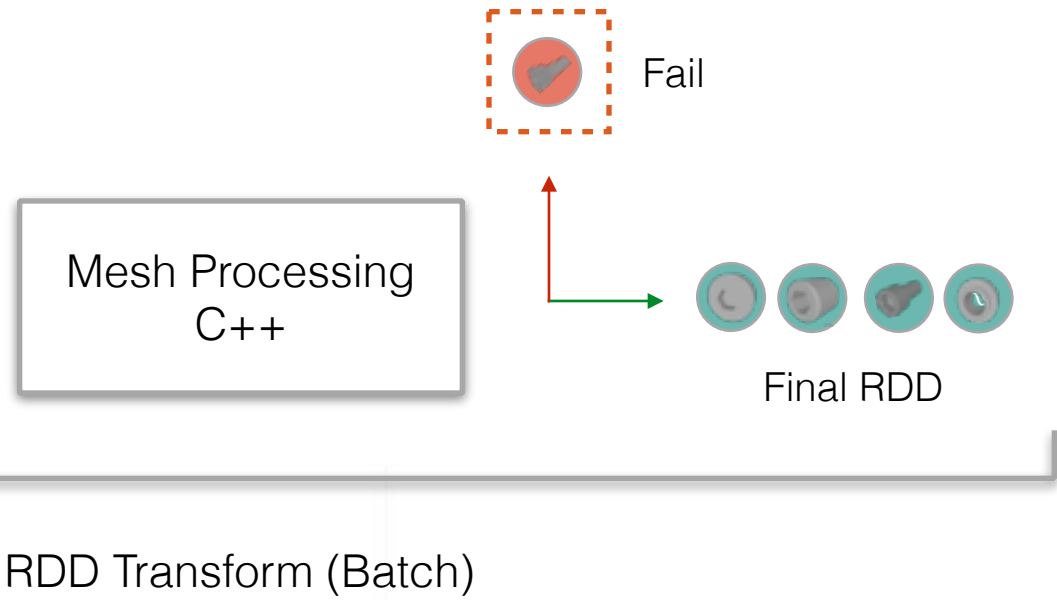
RDD Transform (Batch)

Mesh Processing
C++



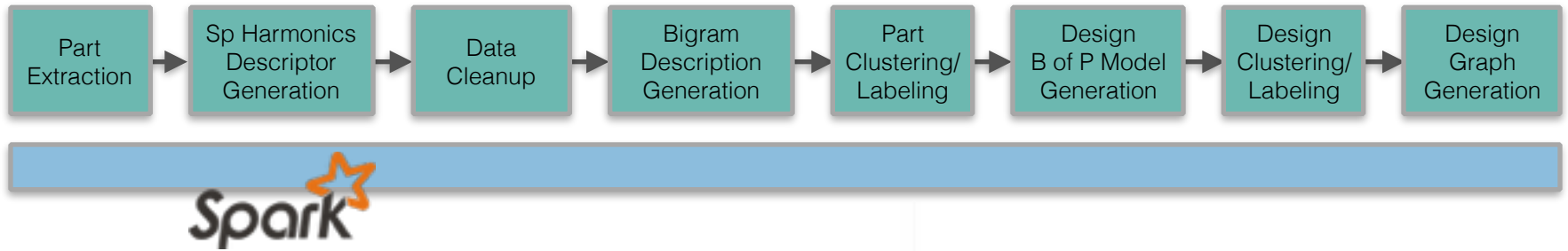
Output RDD

RDD Transform (Batch)

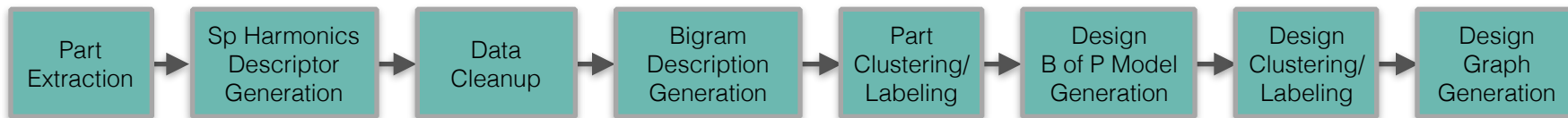


RDD Transform (Batch)

Bonus: Isolated Tests



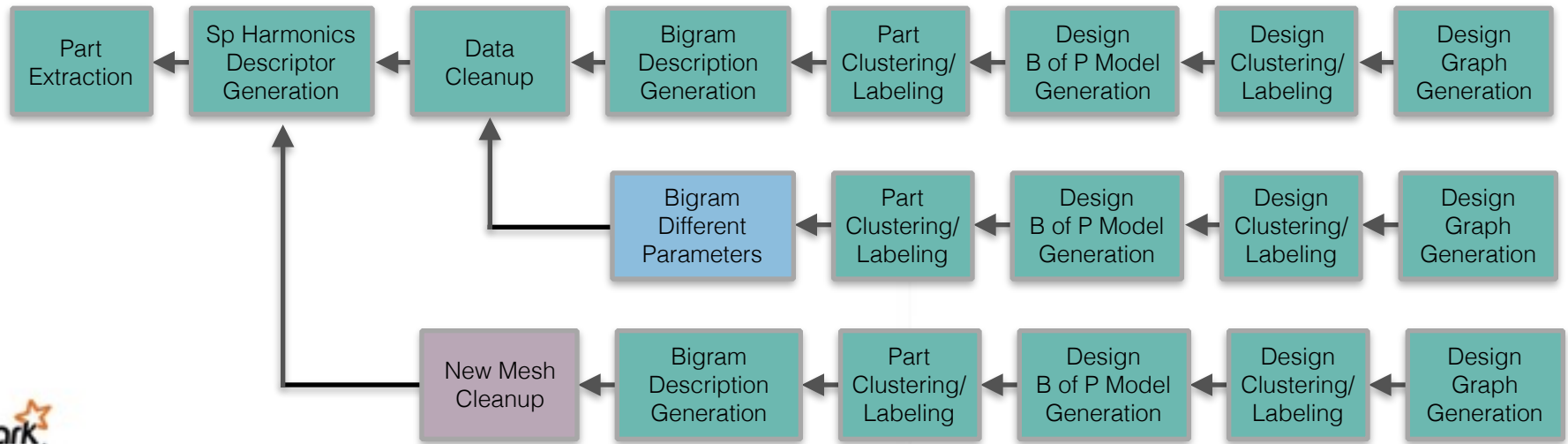
Persistent Lineage (S3)



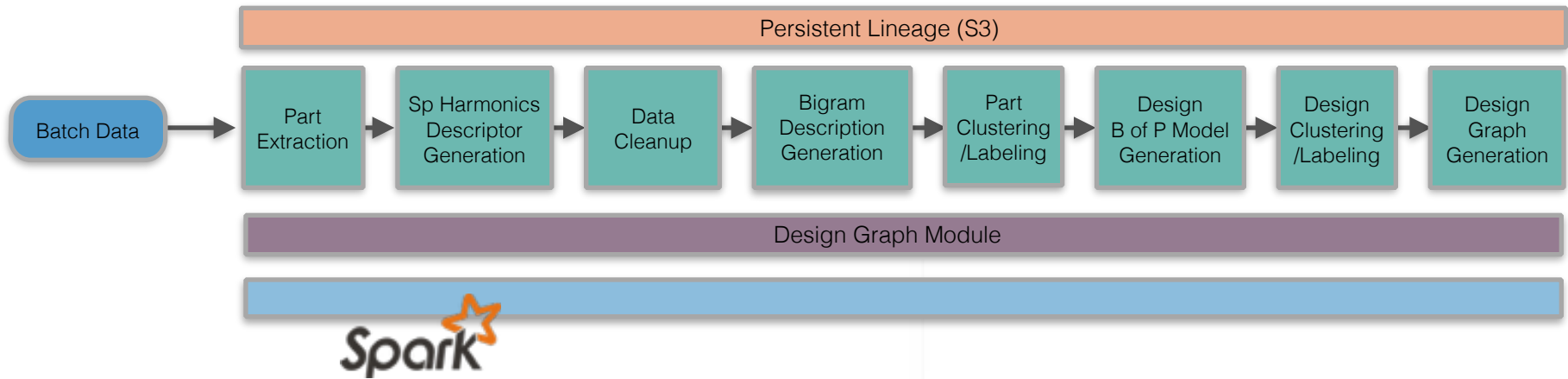
Design Graph Module

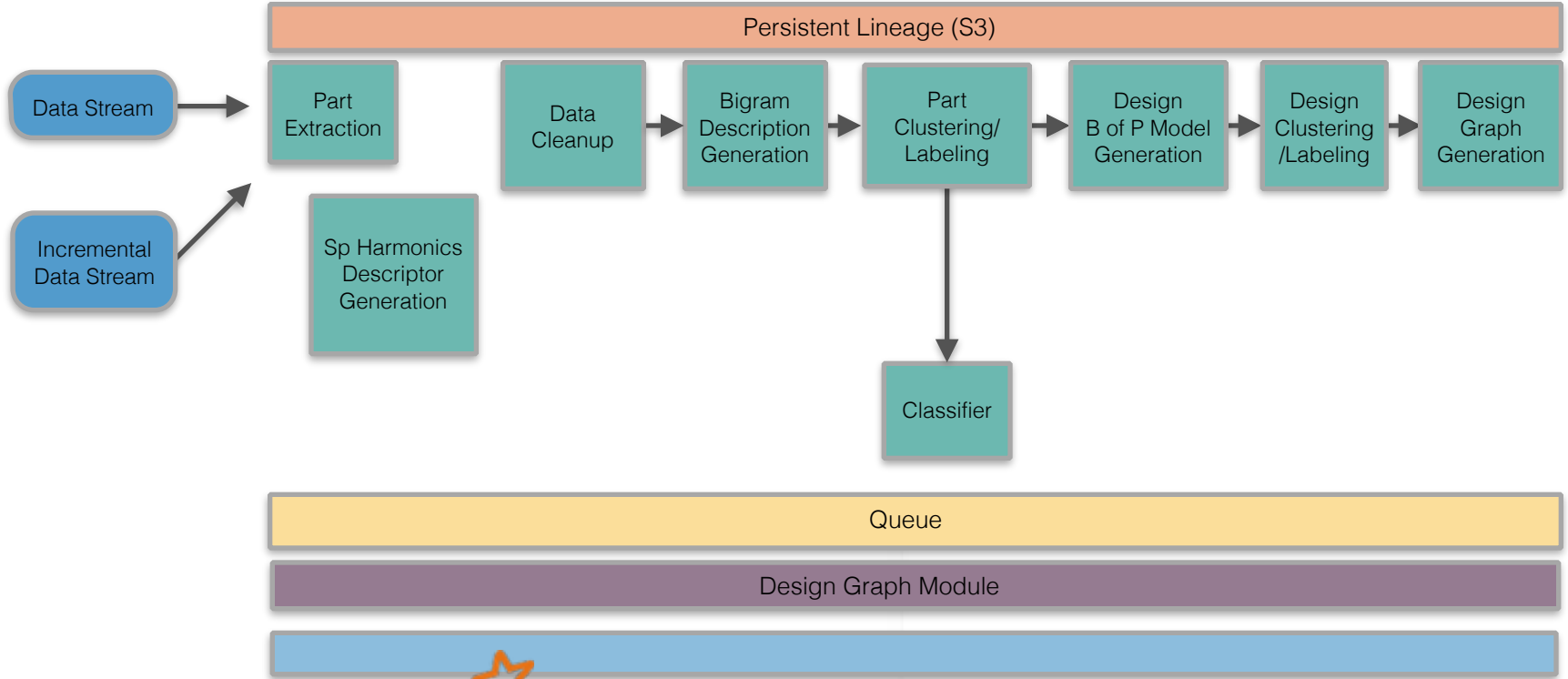


Persistent Lineage (S3)



Demo





The Team!



Mike Haley



Federico Vezzes



Yotto Koga



Senthil Gandhi



Morgan Dornbush



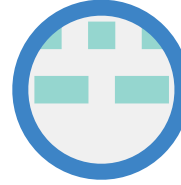
Tara Adiseshan



Carlos Olguin



Khoa Tran



Santiago Sanchez

