

NOTE: Cells marked green indicate instances that are not seen in the other approach

Approach # 0	Alloy's basic instance generation
Approach # 1	Relation Cardinality
Approach # 2	Relation Multiplicity

Legal Instances with #0 (2 instances)

Instance Description	#times found
1 partition, 3 replicas, 2 of them stored on multiple brokers	2

Violations found with #0 (3 violations)

Instance Description	#times found
Replica is not associated with a partition	16
One replica stored on multiple brokers	20
Two replicas of the same partition stored on a single broker	14

Legal Instances with #1 (2 instances)

Instance Description	#times found
Simple Replica -> Partition relation	1
Simple Broker -> Replica -> Partition	1

Violations found with #1 (4 violations)

Instance Description	#times found
Replica is not associated with a partition	3
One replica stored on multiple brokers	2
Multiple brokers storing the same replica	1
Replica associated with multiple partitions	2

Legal Instances with #2 (4 instances)

Instance Description	#times found
Simple Broker -> Replica -> Partition	2
Constraint 12: One partition has two replicas stored on separate brokers	1

Constraint 13: Broker -> Replica1 -> Partition0 and Replica0 -> Partition1	1
Constraint 14: Multiple partitions, with one replica each, both stored on the same broker	1

Violations found with #2 (5 Violations)

Instance Description	#times found
Replica is not associated with a partition	5
One replica stored on multiple brokers	2
Two replicas of the same partition stored on a single broker	1
Replica associated with multiple partitions	5
Multiple brokers storing the same replica	2