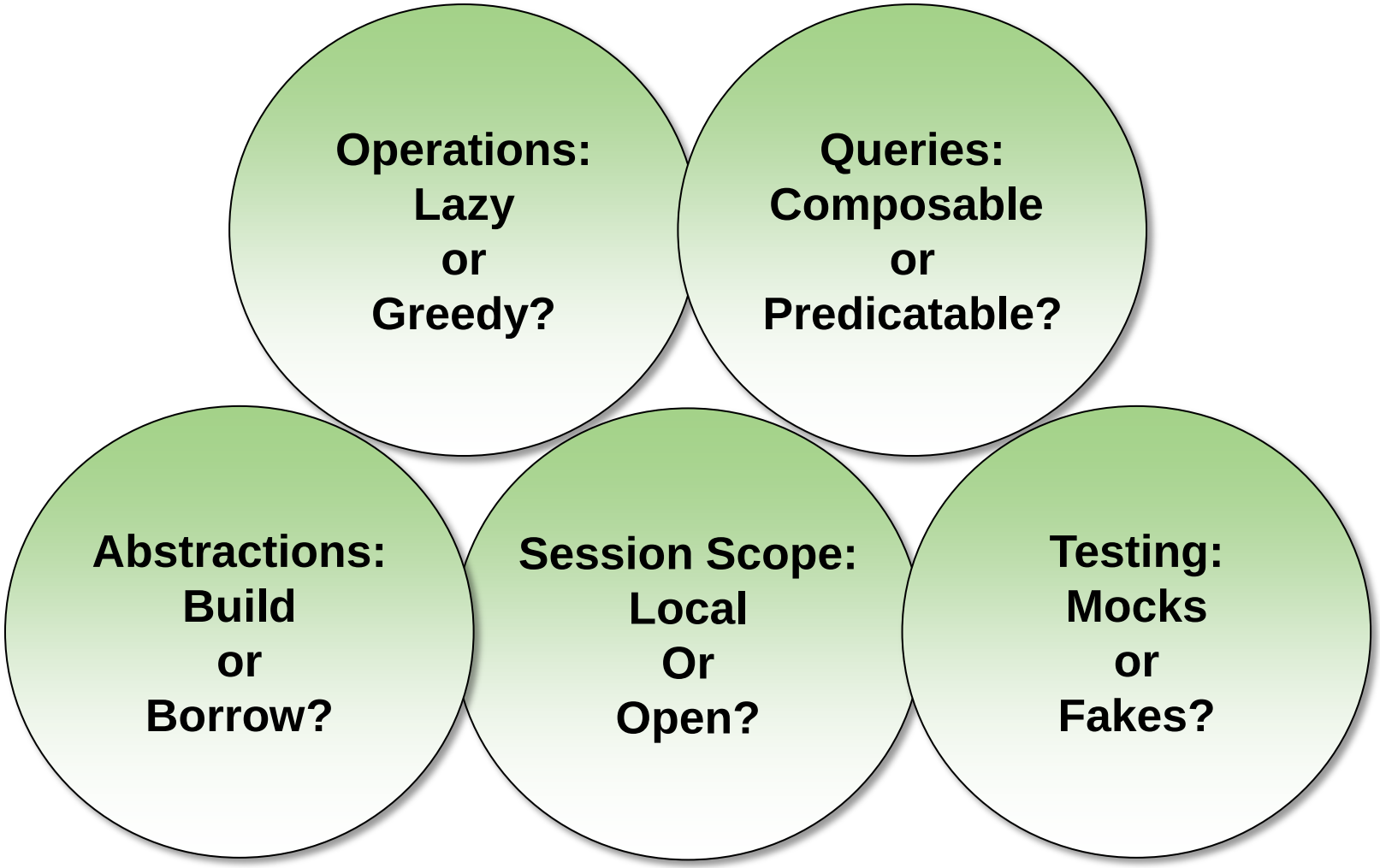
LINQ in Layered Applications

Choices & Patterns

Topics


Operations:
Lazy
or
Greedy?
Queries:
Composable
or
Predicatable?
Abstractions:
Build
or
Borrow?
Session Scope:
Local
Or
Open?
Testing:
Mocks
or
Fakes?

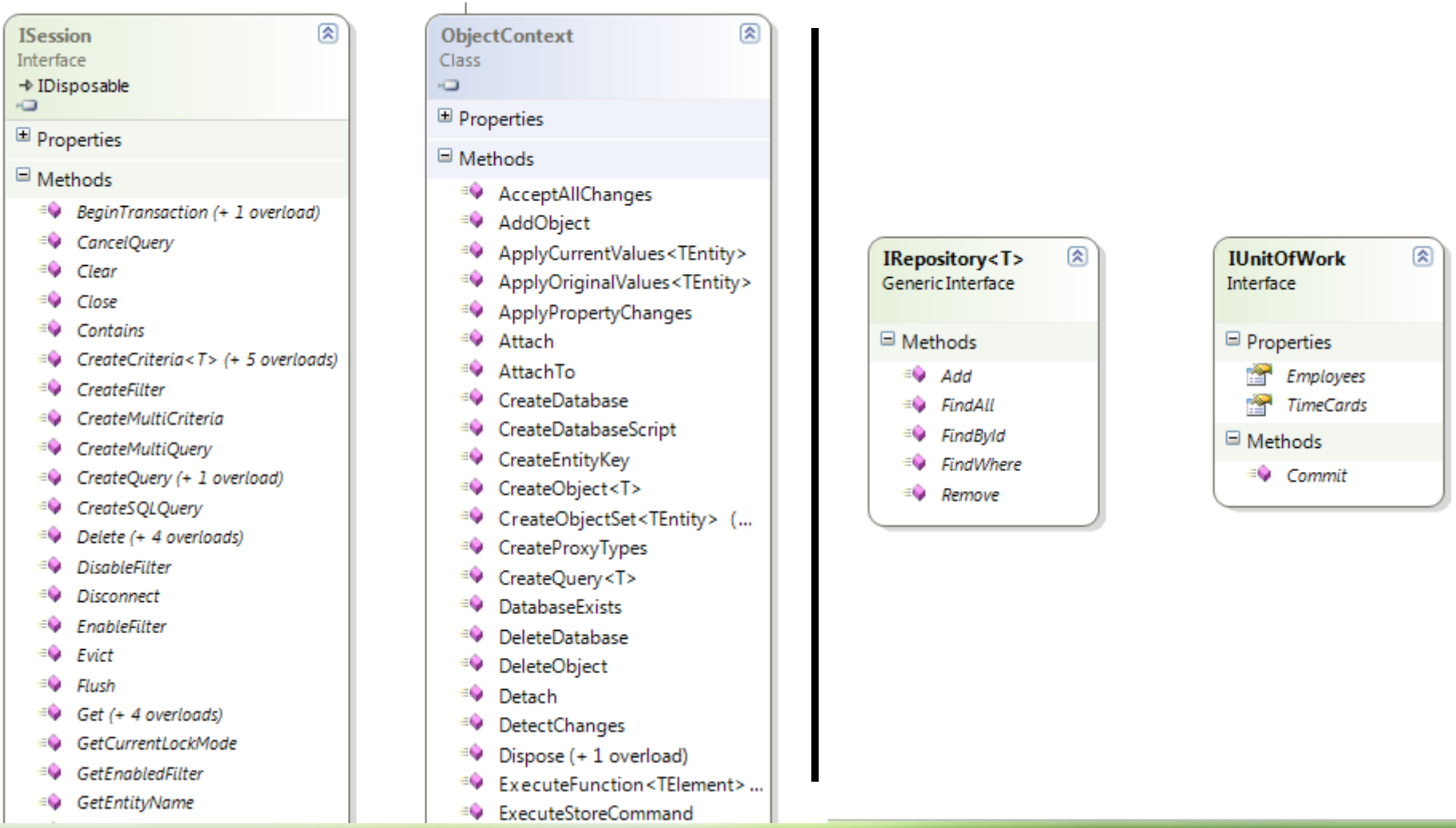
IQueryable

- **What we are talking about applies to most remote LINQ providers**
  - NHibernate
  - Entity Framework
  - WCF Data Services Client
- **We'll use EF in the demos**

Abstractions – Build or Borrow?

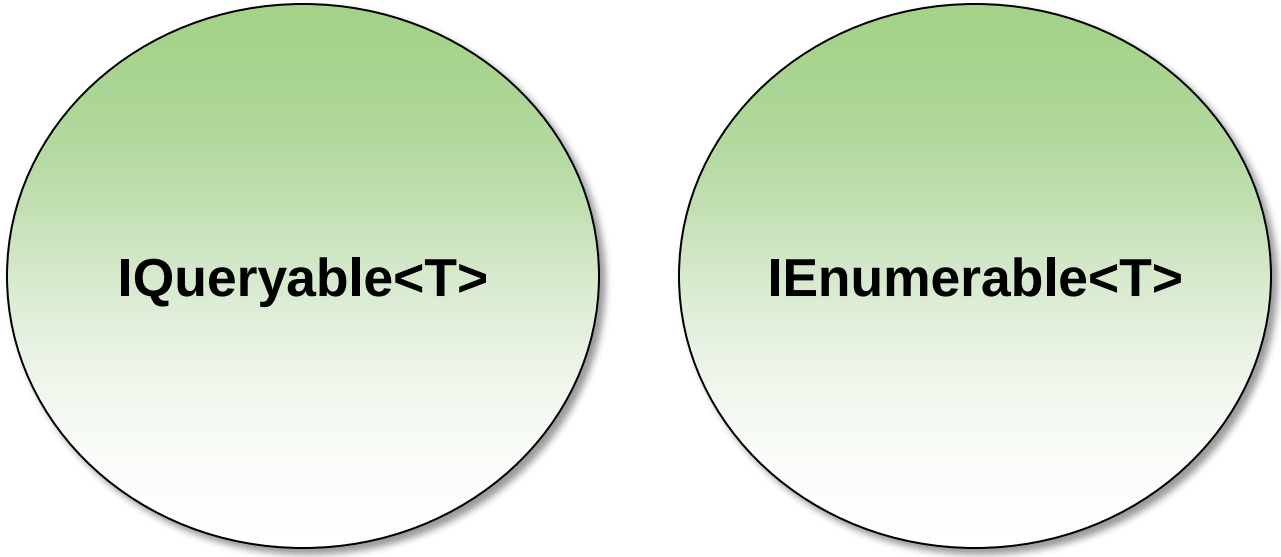
- **Repository Pattern**
  - Build custom repositories (like IRepository<T>)
  - Use a built-in abstraction (like IObjectSet<T>)
- **Unit of Work Pattern**
  - Build your own unit of work
  - Use a built-in abstraction (ISession, ObjectContext)

Pros and Cons



Fully Composable Queries?

- **There are two worlds in LINQ**
  - Both are lazy by default



Pros and Cons

- **IQueryable Pros**
  - Allows a LINQ provider to take a holistic view of a query
  - Generated queries are as efficient as possible
- **Cons**
  - Universe of possible queries isn't as predictable
  - Easier to miss an index

Queries – What are They?

- **What does a query produce?**
  - A concrete list?
  - A data structure for future execution?

```
public IQueryable<T> FindWhere(Expression<Func<T, bool>> predicate) {
    return _objectSet.Where(predicate);
}
```

Stopping Deferred Execution

- **Use one of the "greedy" operators**
  - ToList, ToArray, ToDictionary
- **Produce a concrete type**
  - Sum, First, Single, Count

```
public IList<T> FindWhere(Expression<Func<T, bool>> predicate) {
    return _objectSet.Where(predicate).ToList();
}
```

Deferred Execution

- **Pros**
  - We might not need the result
- **Cons**
  - It doesn't fail fast
  - It might execute more than once!

Testing – Mocks or Fakes?

- **Test doubles for IEnumerable and IQueryable are easy**
  - For fakes use AsQueryable operator

- **IRepository<T>, IUnitOfWork, ISession are easy, too**
  - ObjectContext – not so much

Pros and Cons

- **Fakes**
  - Pros: state testing all the way
  - Cons: test data can be cumbersom
- **Mocks**
  - Pros: can test state or interaction and fewer fakes to write
  - Cons: will still need test data in most scenarios, end result might be more code
- **Other alternatives**
  - Embedded databases
- **Note: you still need integration tests**
  - Some LINQ queries only work against objects ….

Context/Session Scope

- Contexts and Sessions are IDisposable (and often transactional)
- Local to a method?
- Local to a HTTP request or form?

Managing Contexts

- **Keeping context local to a method**
  - Cons: No deferred execution, no lazy loading, no work done outside the method (or is that a pro?)
  - Pros: Easy to see the scope of a unit of work
- **Keeping a context per request or per form**
  - Cons: Need a way to manage the context
  - Pros: No worries on closing a session too early

Summary

- **LINQ offers a powerful abstraction**
  - Easy to implement the Repository and Unit of Work design patterns
  - In most cases just delegate to ORM framework
  - Easy to test with fakes or mocks
  - Tradeoffs around performance and predictability