Error Handling in Qt (and C++)

Today’s Alternatives in Qt

```
bool QFile::open(QIODeviceBase::OpenMode mode)
```

```
QString QIODevice::errorString() const
```

Today’s Alternatives in Qt

```
void QAbstractSocket::errorOccurred(
    QAbstractSocket::SocketError socketError)
```

Today’s Alternatives in Qt

```
int QString::toInt(bool *ok = nullptr,
                 int base = 10) const
```

Today’s Alternatives in Qt

```
QList<T>::const_reference
QList::operator[](qsizetype i) const noexcept
```

Today’s Alternatives in Qt

```
template <typename T> std::optional<T>
QPermission::value() const
```

C++ 23: std::expected<Value, Error>

- Carries either a value, or an error
  - Instantiating with value won’t instantiate a (default) error object
  - Instantiating with error won’t default-construct a value

- Like std:optional, throws exception when trying to access the value when it holds an error, and the other way around.

- Monadic functions: and_then, or_else, transform, transform_error

Implementations in Qt

- q23::expected proposal for Qt Multimedia
    - https://codereview.qt-project.org/c/qt/qtbase/+/437291 (abandoned)
- QSystemResult
    - https://codereview.qt-project.org/c/qt/qtbase/+/546896 (deferred)
- QJniObject experiment
    - If used as return type, opt out of exception handling
- QH2Expected<T, Err>
    - internal API in HTTP2

Proposal

- C++ 17 implementation of std::expected exists
  - https://github.com/TartanLlama/expected by Sy Brand
  - Single header, permissive license (Creative Commons Universal)

- Include it in Qt
- Alias it to qt::expected
- Use it internally
- Use it in public API?