Muutama sana ja kuva suorituskyvystä

Erkki Salonen

Jos joka reissulta oppisi jotakin.

Määritelmiä

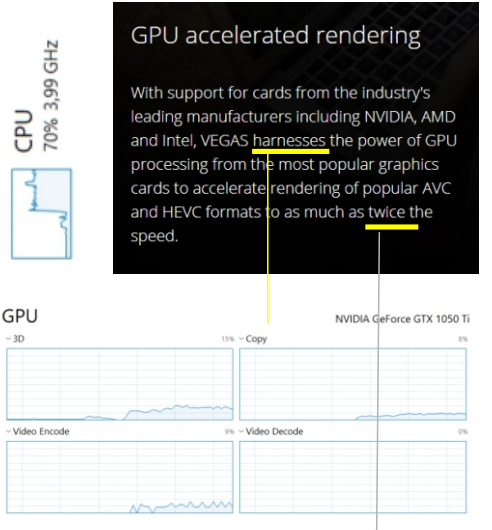
$P=UI \quad [W]$

$P=dW/dt \quad [W]$

Performance=

The most flexible, explainable measurement unit ever!

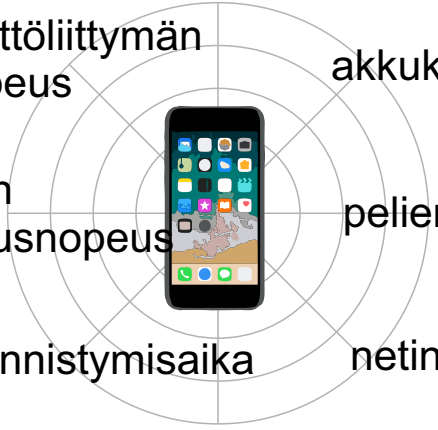
suhteellisuus
mielikuva
mitattavuus

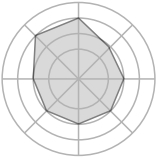


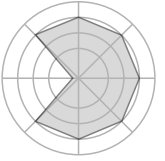
GPU 39 sec
CPU 87 sec

87/39 = 2,2

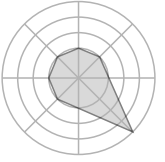
Tasapainoinen tuote







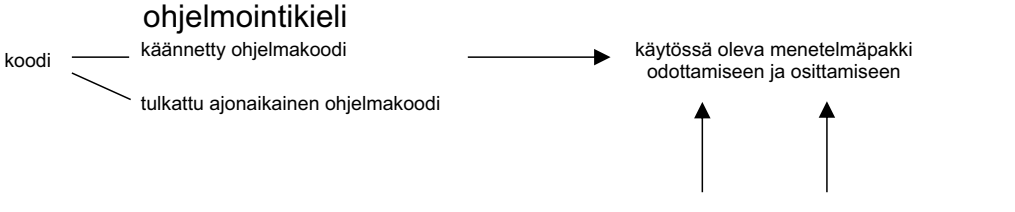
Jokin niin ärsyttävä juttu, että hetken päästä jää laatikkoon.



Ohjelmointikielet & käyttöjärjestelmät

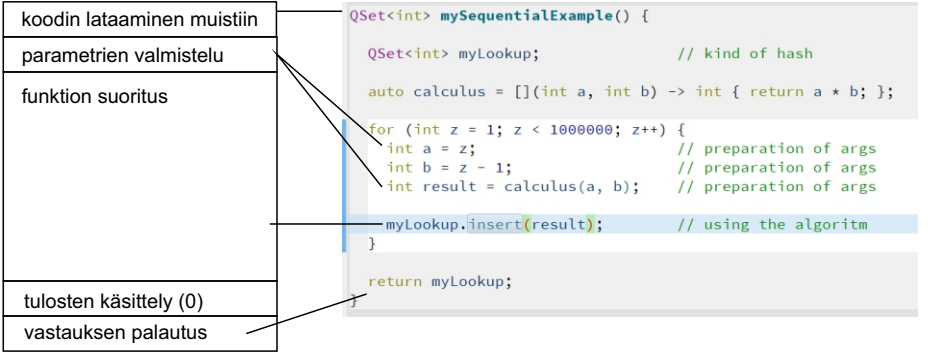
```c
int main(void) {
  int ret = 0;

  bool letsDoSomethingGreat = true;
  while (letsDoSomethingGreat) {

    auto inputData = requestData(arguments); // Blocking function

    auto myOutput = processInput(
        inputData); // This is executed once previous function returns.
    writeOutput(myOutput);
  }

  return ret;*
}
```

BusyWait/Schedule/Promise/Async Await..



* Chuck Norris never return

Suoritusaika



Algorithmic Complexity

Algorithmic complexity is concerned abo
inserting an item in the middle of a QLis
the other hand, inserting an item in the
items must be moved one position in m

To describe algorithmic complexity, we u

- **Constant time:** O(1). A function is s
present in the container. One exam
- **Logarithmic time:** O(log *n*). A funct
number of items in the container. (
- **Linear time:** O(*n*). A function that r
container. One example is QVector
- **Linear-logarithmic time:** O(*n* log *n*)
faster than a quadratic-time functi
- **Quadratic time:** O(n^2). A quadratic-
container.

\+ epäsuorat vaikutukset muualle

Suoritusaika, rinnakkaisajo

koodin lataaminen muistiin

parametrien valmistelu

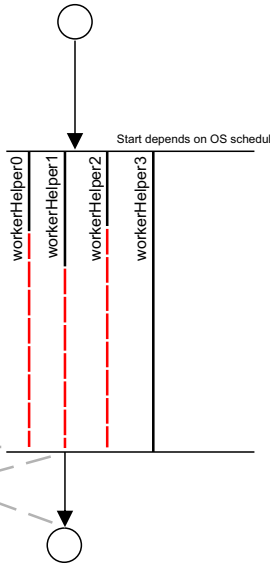
funktion suoritus

odotusta

tulosten käsittely

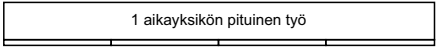
vastauksen palautus

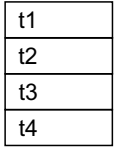
```
QSet<int> workerHelper(int start, int stop) {
  QSet<int> ret;
  auto calculus = [](int a, int b) -> int { return a * b; };
  for (int z = start; z < stop; z++) {
    int a = z;                    // preparation of args
    int b = z - 1;                // preparation of args
    int result = calculus(a, b); // preparation of args

    ret.insert(result); // using the algoritm
  }
}

QSet<int> myParallelExample() {
  QSet<int> myLookup; // kind of hash
  auto idealThreadCount = QThread::idealThreadCount();
  auto itemsCount = 1000000;
  auto jobSize = itemsCount / idealThreadCount;

  QFutureSynchronizer<QSet<int>> synchronizer;

  for (int jobIndex = 0; jobIndex < idealThreadCount; ++jobIndex) {

    int start = jobIndex * jobSize;
    int stop = start + jobSize;

    synchronizer.addFuture(QtConcurrent::run(
        &workerHelper, start, stop)); /* Start job on another thread */
  }

  synchronizer.waitForFinished(); // wait that jobs are finished.

  for (const auto &result : synchronizer.futures()) { // prepare answer
    myLookup += result;
  }
  return myLookup;
}
```

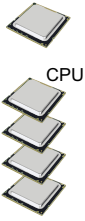


Hajautus

Voidaanko työ jakaa toisistaan riippumattomiin osiin? t1..4







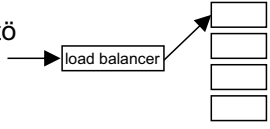
Ei jos t2 laskennan parametreihin tarvitaan t1:n tulos.

"työn kesto 1/4 aikayksikköä, 4 työtä aikayksikössä"

Hajautin

Muistiblokin pakkaaminen

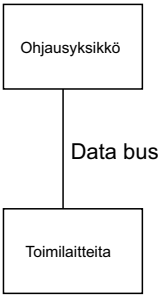
Sisääntuleva http-pyyntö

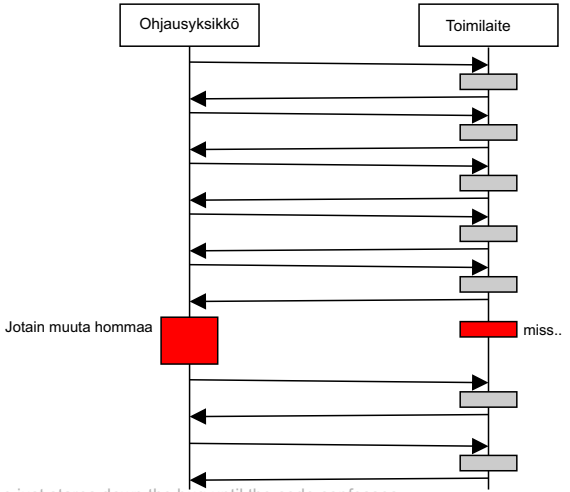


Ihmisten laskeminen kuvista

Hajautanko kuva vai tiedostotasolla?

Hajautus , viive





Tyhmä laite kuormittaa isäntää vaatimalla jatkuvaa ohjausta.

Voisiko toimilaitteen älyä nostaa jolloin kommunikaatiokuorma vähenee?

The increase of IoT devices at the edge of the network is producing a massive amount of data to be computed to data centers, pushing network bandwidth requirements to the limit. Despite the improvements of network technology, data centers cannot guarantee acceptable transfer rates and response times, which could be a critical requirement for many applications. /Wikipedia/

Chuck Norris doesn't need a debugger, he just stares down the bug until the code confesses.

Hajautus, tietokoneen rajoitteet

Ohjelmat eivät pyöri
ideaalisessa tietokoneessa
vaan muistiaccessaika voi vaihdella huomattavasti.

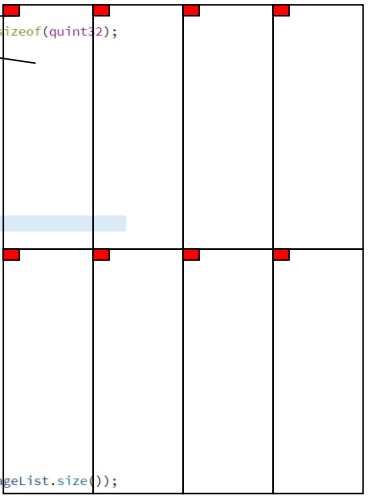
CPU

cache

system memory

```cpp
class myPoorPerformingClass {

  QPoint coordinate;
  static const int fixedImageSizeBytes = 1024 * 1024 * sizeof(quint32);
  quint8 myImageData[fixedImageSizeBytes];
  /* Other member variables */

public:
  myPoorPerformingClass() = default;
  quint8 *getImageData() { return myImageData; }
  void randomizeCoords() { coordinate = randomize(); }
  QPoint &getLocation() { return coordinate; }
};

void createSampleImagesAndCalculateAvgCoordinate() {
  int maxImageCount = 1000;
  QList<myPoorPerformingClass> imageList;
  for (int k = 0; k < maxImageCount; k++) {
    myPoorPerformingClass img;
    img.randomizeCoords();
    imageList.append(img);
  }

  int xSum = 0;
  int ySum = 0;
  for (auto &img : imageList) {
    xSum += img.getLocation().x();
    ySum += img.getLocation().y();
  }
  Q_ASSERT(!imageList.isEmpty());

  QPoint avgLocation(xSum / imageList.size(), ySum / imageList.size());
}
```

100 kpl



Chuck Norris doesn't have disk latency because the hard drive knows to hurry the hell up.

```
if ( timeLeft==true ) {
    digitalisaatioKevyempiEsimerkki();
}
else {
    kiitäYleisöä();
}
```

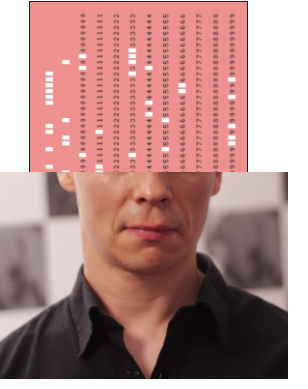
Digitalisaatio hieman kevyempi esimerkki..

Robotti-imuri

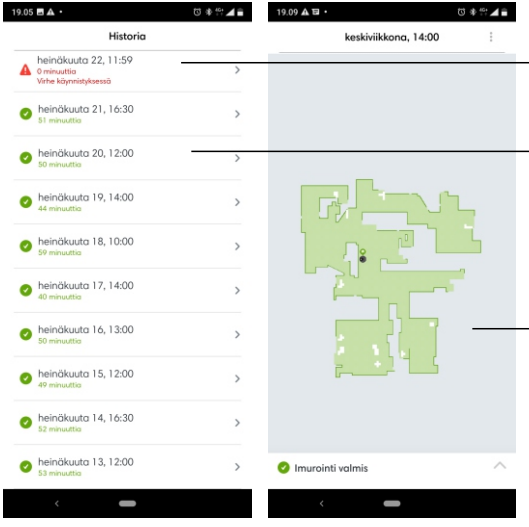
~870€, <<100 €/kk

Imuriyhdistelmä

150€ + >>100€/kk



Digitalisaatio hieman kevyempi esimerkki..



Rehellinen!

Täydellinen sitoutuminen!

Dokumentoitua näyttöä suoritetusta työstä!

Kiitoksia ajastanne!

Lähteitä
Kannen kuva elokuvasta Pulp Fiction
Chuck Norris sanalaskut https://www.warrenchandler.com/2013/09/04/if-chuck-norris-was-a-programmer/