Designing and Presenting a Scientific Poster

Jonathan Carter
Associate Laboratory Director
Computing Sciences
Poster Sessions at Major Conferences

- Sessions for attendees to mingle in and around posters and presenters
- Posters usually viewable any time the conference is in session
- Often there is a poster session or reception
- Often 100s of posters are presented
## Presentations vs. Papers

<table>
<thead>
<tr>
<th>Papers</th>
<th>Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Single preplanned narrative</td>
<td>– Preplanned narrative</td>
</tr>
<tr>
<td>– Write/Read</td>
<td>– Speak/Listen</td>
</tr>
<tr>
<td>– Remote audience</td>
<td>– Captive audience</td>
</tr>
<tr>
<td>– Reader can take their time</td>
<td>– Time-slot of 15-60 minutes</td>
</tr>
<tr>
<td>– Multiple pages</td>
<td>– Multiple slides</td>
</tr>
<tr>
<td>– Arms-length interaction</td>
<td>– Increased chance of interaction</td>
</tr>
</tbody>
</table>
Presentations vs. Papers vs. Posters

**Papers**
- Single preplanned narrative
- Write/Read
- Remote audience
- Reader can take their time
- Multiple pages
- Limited interaction

**Presentations**
- Preplanned narrative
- Speak/Listen
- Captive audience
- 15-60 minutes
- Multiple slides
- Increased chance of interaction

**Posters**
- Multiple narratives
- Discussion
- Browsing audience
- ~5 minutes per discussion
- Single page/slide
- Interactive
- Often posters can be viewed outside of session
Understanding Your Audience

• People in your field of specialization
  – Can get to specifics

• People in closely-related field of specialization
  – Need context, may be unfamiliar with your jargon

• People in unrelated fields
  – Need to explain the problem and the solution. Will not understand your jargon
Basic Poster Content – Header

• Title
  – Briefly convey the subject matter, orient the viewer
  – Attract interest without gimmicks

• Author(s)
  – Contact Information
Basic Poster Content – Main Section
Alternate #1

• **Introduction**
  – Problem Statement (why it matters), avoiding as much jargon as possible

• **Methodology**
  – Not too much detail, graphics work well in many cases

• **Results**
  – What worked, what didn’t
  – Brief data analysis

• **Conclusions**
  – Your interpretations (Don’t repeat results)
  – Further work

• **Extras**
  – QR Code: Pointer to online resources
  – Flip or slide panels
  – Video
Basic Poster Content – Main Section Alternate #2

- **Introduction**
  - Problem Statement (why it matters), avoiding as much jargon as possible

- **System Design & Features**
  - Not too much detail, graphics work well in many cases

- **Future Enhancements**
  - Further work

- **Extras**
  - QR Code: Pointer to online resources
  - Flip or slide panels
  - Video
Basic Poster Content – Footer

- Citations
- Acknowledgements/ Logos / Institutional Verbiage
- Further Information
Use Visual Communication

- Graphics to help you talk to your work
- Label graphs and charts legibly, and clearly enough that the label stands on its own
- Use different portions of poster to engage at different level of abstraction and separate logical concepts
Things to Avoid (1)

• Avoid over-crowded or busy layouts
  – Flow is often confusing, or the eye doesn’t know where to look

• Avoid garish color schemes or awkward font choices

• Dark backgrounds can sometimes print poorly

Credit: Applied Math Dept., Illinois Tech

http://bonfx.com/bad-typography/
Things to Avoid (2)

1,958 words (28pt Times New Roman) can be crammed onto a 56 x 35” poster that has space between elements but only annoying logos for visual relief

Colin Purrington
666 Teipai Street, Posterville, PA 19801, USA

http://colinpurrington.com/tips/poster-design
• Avoid writing an article pretending to be a poster
  – Aim for 500-700 words

• Avoid large blocks of condensed text
  – Use appropriate white space
  – Consider using lists

1,958 words (28pt Times New Roman) can be crammed onto a 56 x 35” poster that has space between elements but only annoying logos for visual relief

Colin Purrington
666 Teipai Street, Posterville, PA 19801, USA
# Things to Avoid (3)

<table>
<thead>
<tr>
<th></th>
<th>Boxes within boxes</th>
<th>Zigzag reading order</th>
<th>More than three typefaces</th>
<th>Long-winded title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different parts of poster don’t line up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gradient fills in coloured boxes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than five colours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abstract</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables showing data that could be in a graph</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Big blocks of text
- Photographic background
- Unlabelled error bars on graphs
- Pixelated pictures
- Institutional logos bookending title
- Free space
- ALL CAPITALS
- Text with shadows, outlines, or bevels
- Underlined text
- Comic Sans
- 3-D graphs
- Checking tablet or phone during presentation
- Poster does not fit on poster board
- Comic Sans (it’s that annoying)
- Objects almost touching or overlapping
- Tiny, unreadable typo

Don’t Be a Winner at Bad Poster Bingo by Zen Faulkes
http://betterposters.blogspot.com/2013/10/bad-poster-bingo.html
Marketing Your Poster

- Make your poster compelling so it will stand out
- Look like you want people to stop and talk
- Don’t stand in front of your poster
- Make room for multiple visitors
- Talk to your visitors as opposed to your poster
- Think of various short pitches that you could employ
- Handouts, business cards

Can be taken to excess:

http://betterposters.blogspot.com/2012/03/colour-clash.html
1-Minute Pitch and/or Video Introduction

• Many poster programs feature a set of 1-minute pitches where all poster authors can explain why someone should visit their poster
  – You need a hook to stand out
  – Pose a puzzle

• Recent virtual poster sessions often have online posters accompanied with short introduction videos by authors
  – Record one of your pitches and use a visual on the poster
Follow Poster Session Instructions

• Note format and size requirements

• Put up and take down your poster in a timely manner
Standing Out - Posters from SC19
Standing Out - Posters from SC19
Standing Out - Posters from SC19
Standing Out - Posters from SC19

Abstract
Quantum computing (QC) is a potential post-Moore HPC technology. QC algorithms aim to solve problems beyond the capabilities of even the largest classical supercomputers.

Linear-tape model trapped-ion is one of the leading technologies for building scalable quantum computers. We present an ILP-based scheduling algorithm for linear-tape model machine, called STRIQC, a Scheduler for TRapped-Ion Quantum Computing.

Our results show that STRIQC can reduce 29.47% circuit latency on average compared to FPFC scheduling. The results also suggest we will achieve the optimization for large circuits with classical HPC support.

Linear-Tape Model
Arbitrarily aligned modules (AMMs) generate the laser beams to perform single-qubit rotation gates and XX-gates between arbitrary pairs of qubits.

The laser beams can move in the direction of the qubits, and the qubits are within the laser beams intersection area.

The ion movement is directed towards the center of the trap. Each qubit is slightly repelled by the center of the trap, which reduces the movement time.

The movement time is proportional to the moving distance.

Optimization
- Laser Beam: 4
  - Total moving distance: 4
  - Circuit depth: 3
  - Total moving distance: 4
  - Circuit depth: 4
  - Total moving distance: 4
  - Circuit depth: 5

Optimization VS Compilation Time
- • Optimizing the whole circuit might take too long time to finish the compilation.
  • The circuit can be approximately optimized by dividing it into multiple small circuit blocks.
  • Performing STRIQC on each circuit block to get the approximate optimization for the entire circuit.

Compilation Flow
- High-Level Quantum Program
  - Quantum Assembly (QASM)
  - Swap Gate Insertion
  - Trapped Ion Native Gates
  - Gating Circuit Blocks
  - STRIQC (ILP Solver)
  - Scheduled Gates and Movements

Results
- Total Qubit: 16
- Time\textsubscript{compilation}: 180us
- Time\textsubscript{total}: 5us

Future Work
- Investigate factors that causes long compilation time, and explore techniques to reduce the compilation time.
- Evaluate the total circuit fidelity with detailed noise models and schedule circuits to maximize success rate.
- Implement our test flow on nPYC to achieve large circuit block optimization to increase the quality of the solution.

Acknowledgments
This research was supported in part by Argonne Leadership Computing Facility (ALCF) with a DOE Office of Science award. This material is based upon work supported by the Department of Energy under Award No. DE-AC02-76SF00515, and the Berkeley Quantum Computing Incubator (BQCI). This work was performed under the auspices of the U.S. Department of Energy, Office of Science, Office of Advanced Scientific Computing Research (ASCR).
Resources

• Colin Purrington, Swarthmore College
  – http://colinpurrington.com/tips/poster-design
  – Suggestions for software, templates, and more…

• Zen Faulkes, University of Texas
  – http://betterposters.blogspot.com
  – Advice and poster critiques, up-to-date resource,…

• George Hess, Kathryn Tosney, and Leon Liegel, North Carolina State University
  – http://go.ncsu.edu/posters
  – More basic advice on formats, style, poster elements, etc.
CS Summer Visitor Program Hybrid Poster Session

- **August 2nd 10:00am PT**
- Register by July 15th 5pm PT to get template
- Posters and 5-min walkthrough video due by July 22nd 5pm PT
- Posters and videos will be available for staff to view online and all posters will be available in B59 on August 2nd
- Virtual attendees will give lightning talks via Zoom, in-person attendees can stand by their poster

High visibility for lab scientists in CS and elsewhere in the lab
A great way to practice poster design and presentation

“Leading up to the poster session I was really nervous about presenting and being able to answer any question people might have. But, when it came time to talk about all of the interesting and hard work that our team had been doing I started to just have fun with it by focusing on the topics of interest within the audience and connecting with them through science. This moment best showcased the genuine and collaborative atmosphere at the lab as I felt supported and valued across disciplines, education levels, and experience strengths.”

2021 Presenter

Jessica Hatcher from Fort Valley State University in Georgia won a first-place award for her research poster “at the 74th Joint Annual Meeting of The National Institute of Science / Beta Kappa Chi National Scientific Honor Society
Examples
WHICH IS MORE IMPORTANT: NUMBER OF PATCHES OR CONNECTIVITY?

INTRODUCTION AND OBJECTIVES

Metapopulation conservation efforts with limited resources would benefit from a clear understanding of the effects of different conservation strategies, so that the conservationists can decide how to best spend their resources. In particular, as metapopulations with randomly occurring patch extinction and recolonization, it is desirable to know what conservation strategy is more effective: is it better to spend effort to add new patches to the metapopulation, or is it better to spend that effort to facilitate migration between patches?

As an aid to real-life conservation efforts, this model might be useful in weighing various strategies. For example, if the conservation choices for an endangered species are either to buy land to connect existing habitats (increasing connectivity), or to simply work to preserve multiple habitats (increasing number of patches), the model may avoid a solution which is economically preferable but ecologically ineffective. I developed a simple metapopulation model to investigate this issue. I ran the model using varying numbers of patches, where each patch is considered to be either extinct or occupied, and where every pair of patches is either connected or disconnected for purposes of migration. The whole metapopulation is considered to be extinct if and only if all of the patches are extinct.

THE PROGRAM

Set Initial Conditions:

- Starting patch habitation was randomly determined, and so the results may not correspond well to specific species metapopulations with known starting conditions.
- All patches were assumed to be either fully occupied or extinct, and of equal value to the metapopulation.
- All migration pathways were equivalent, regardless of spatial distances or other factors involved.

Simultaneously update the recolonization and extinction rates:

- The model had a low resolution for differing extinction and migration probabilities within a number of patches. It is possible that for specific parameter values, this amalgamation will hide results contrary to the overall trend reported here.

Assumptions and Limitations:

- Additional migration pathways were added in a manner which kept the number of pathways for each patch fairly constant. No effort was made to investigate the effects of less-symmetric configurations.
- Starting patch habitation was randomly determined, and so the results may not correspond well to specific species metapopulations with known starting conditions.

RESULTS

The results of this model indicate that, when possible, adding patches to a metapopulation is far preferable to incremental increases in numbers of migration pathways. There are some cases in which substantial gains in numbers of pathways can improve the long term viability of the metapopulation compared to addition of a patch. When the costs of these additional pathways is relatively low, this may be a good strategy; however in most cases the greatest benefit to the metapopulation will come from adding more patches.

It is worth noting that in our results, the curve for each additional patch is steeper than the last. It may be the case that the low number of patches I tested is an important limit on the effects of connectivity. Simulations using larger numbers of patches may show that increased connectivity can have a greater effect on metapopulation survival than is seen here.

CONCLUSIONS

A metapopulation is a collection of discrete population patches, in which individual patches may typically go extinct and be recolonized. Is the long-term viability of the metapopulation helped more by adding new patches or by increasing the number of migration pathways between existing patches?

Adding patches increases the overall population of the organism, and makes a total extinction less likely by increasing the sheer number of patches which would have to go extinct.

Adding migration pathways increases the likelihood of recolonization of extinct pathways, by giving extinct patches more sources for immigration.

The model amalgamated results from differing extinction and migration probabilities within a number of patches. It is possible that for specific parameter values, this amalgamation will hide results contrary to the overall trend reported here.

I tested the model by running simulations which varied over four parameters:

- Number of patches (values 4, 5, 6, and 7)
- Minimally connected to maximally connected (expressed as the ratio of migration pathways to number of patches, or c/p)
- Time-step extinction probabilities of .2, .4, .6, and .8
- Time-step migration probabilities of .2, .4, .6, and .8

For every combination of these parameters, I ran 100 simulations of 1000 time-steps each, and tracked the number of instances out of those 100 runs that the metapopulation did not go extinct. For each number of patches, I then summed the numbers of surviving metapopulations for each connection ratio to obtain a summary value for each patch/polyway configuration. The results are graphed below. The model showed that increasing the number of patches by only one patch had a far greater effect on metapopulation survival than did increasing the connectivity between patches. A horizontal line intersecting two result curves would, at each intersection, show the ratio of connectivity necessary to achieve the same survival rate for each of the two metapopulations. In every case, the metapopulation with the greater number of patches requires a lower connectivity ratio to maintain the desired survival level. In some cases, as with four patches, no increase in connectivity could have the same effect on metapopulation survival as a adding a single patch.

WHICH IS MORE IMPORTANT: NUMBER OF PATCHES OR CONNECTIVITY?

Darin Kalisak, PBS Student
Contact: dkalisak@unity.ncsu.edu

INTRODUCTION AND OBJECTIVES

Metapopulation conservation efforts with limited resources would benefit from a clear understanding of the effects of different conservation strategies, so that the conservationists can prioritize their efforts. In particular, metapopulations with randomly occurring patch extinction and recolonization, it is desirable to know what conservation strategy is more effective: is it better to spend effort to add new patches to the metapopulation, or is it better to spend that effort to facilitate migration between patches?

As an aid to real-life conservation efforts, this model might be useful in weighing various strategies. For example, if the conservation choices for an endangered species are either to buy land to connect existing habitats (increasing connectivity), or to simply work to preserve multiple habitats (increasing number of patches), the model may avoid a solution which is economically preferable but ecologically ineffective.

I developed a simple metapopulation model to investigate this issue. I ran the model using varying numbers of patches, where each patch is considered to be either extinct or occupied, and where every pair of patches is either connected or disconnected for purposes of migration. The whole metapopulation is considered to be extinct if and only if all of the patches are extinct.

THE ISSUE

CONCLUSIONS

The results of this model indicate that, when possible, adding patches to a metapopulation is far preferable to incremental increases in numbers of migration pathways. There are some cases in which substantial gains in numbers of pathways can improve the long term viability of the metapopulation more than the addition of a new patch. However, in most cases the greatest benefit to the metapopulation will come from adding more patches.

It is worth noting that in our results, the curve for each additional patch is steeper than the last. It may be that the low numbers of patches added are an important limit on the effect of connectivity. Simulations using larger numbers of patches may show that increased connectivity can have a greater effect on metapopulation survival than is seen here.

I tested the model by running simulations which varied over four parameters:

- number of patches (values 4, 5, 6, and 7)
- migration rate
- extinction rate
- metapopulation effort

For every combination of these parameters, I ran 100 simulations of 1000 time-steps each, and tracked the number of instances out of those 100 runs that the metapopulation did not go extinct. For each number of patches, I then summed the numbers of surviving metapopulations for each connection ratio to obtain a summary value for each patch/predation configuration. The results are graphed below. The model showed that increasing the number of patches by only one patch had a far greater effect on metapopulation survival than did increasing the connectivity between patches. A horizontal line intersecting two trend curves would, at each intersection, show the ratio of connectivity necessary to achieve the same survival rate for each of the two metapopulations. In most cases, the metapopulation with the greater number of patches requires a lower connectivity ratio to maintain the desired survival level. In some cases, as with four patches, no increase in connectivity could have the same effect on metapopulation survival as a adding a single patch.

Too many large text blocks, Some issues about flow (solution stated before problem), Poor color contrast in some sections, Some unlabeled figures, A cut-and-paste from Excel, but

A reasonable overall balance and format, clear titles

ABSTRACT:
One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never gain an gram, and the only side effect would be the need to upgrade one’s stretchy pants (“exercise pants”). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight - and those at risk for overweight - to space would be a lasting cure.

INTRODUCTION:
The current obesity epidemic started in the early 1960’s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constraining pressure forces fat molecules to adopt a more compact tertiary structure (Kavoor 1983).

RESULTS:
In a recent study, we examined the effects of space travel on body weight gain in a cohort of Guinea pigs. The results were striking. The pigs gained only 0.00001 g per month, and none gained more than 0.0001 g. The pigs were also able to eat as much as they wanted, and they maintained their weight gain without any added exercise. This is in contrast to the findings of previous studies, which showed that pigs gain weight when they are fed ad libitum on Earth.

CONCLUSIONS:
Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and federal IRBs.

LITERATURE CITED:


Acknowledgements:
I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of waves divorced from entirely wealthy spaceflight startups. I am also grateful for comments on early drafts by Marissa Athletic Club, Corpus Christi, USA. Finally, sincere thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

Copyright Colin Purrington
http://colinpurrington.com/tips/academic/posterdesign
PIGS IN SPACE:
EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS

Colin B. Purrington
6673 College Avenue, Swarthmore, PA 19081 USA

ABSTRACT:
One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never gain an gram, and the only side effect would be the need to upgrade one's stretchy pants ("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmless, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days each Guinea pig was weighed.

INTRODUCTION:
The current obesity epidemic started in the early 1960's with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constricive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1993).

LITERATURE CITED:
NRA 1982 Project STS-XX: Guinea Pigs. Leaked internal memo.

RESULTS:
Mean weight of pigs in space was 0.0000 +/- 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be startled and stressed against the force plate, in the case of pigs in Earth. Individuals in the Earth cohort, gained about 240 g/month (p = 0.0002). Males and females gained a similar amount of weight on Earth (no main effect of sex), and size at any point during the study was related to starting size which was used as a covariate in the ANOVA. Both Earth and space pigs developed substantial deviations (double chins) and were lethargic at the conclusion of the study.

ACKNOWLEDGEMENTS:
I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of vets divorced from insolvency wanting spaceflight startups. I am also grateful for comments on early drafts by Mariana Athletics Club, Corpus Christi, USA. Finally, sincerely thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

LITIGATION EXES:
One hundred male and one hundred female Guinea pigs (Cavia porcellus) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by duct-taping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

• Too many large text blocks
• Text confused with background
• Randomly sized and colored boxes
• Annoying logos
• Cutesy and hard-to-read title

copyright colin purrington
http://colinpurrington.com/tips/academic/posterdesign
Apex-Map: Memory Access Probe

Apex-Map generates memory references as stochastic variates based on sampling the following random process:

\[ s_i = \frac{M}{L} \alpha^i \]

where \( \alpha \) represents the temporal locality parameter of an application, \( M \) represents the memory footprint of this application, and \( L \) represents the spatial locality parameter of the application.

Assessing the Performance of an Architecture

Performance curve studies the system interaction with multiple locality parameters.

Figure shows average cycle per memory access for multiple locality parameters. (The lower the cycles the better the performance)

Using Apex Map as an Application Proxy

Other parameters are added to the model to capture complex application, such as computational intensity, register pressure, and concurrency level.

The figures below show that Apex-Map can follow the behavior of CUPS application closely.

Application Communication Profiles

Characterize communication by using IPM profiling layer: run the full application unmodified and obtain the communication patterns. This shows the variety of communication signatures of DOE apps.

Extract Major Kernels

Based on communication and performance profiles, extract the major computational kernels into probes/reduced benchmarks, which can then be used for tuning and optimization.

Discovering Prefetch Behavior using Stanza Triad

Based on the memory access pattern of cache-blocked stencils, the Stanza Triad is a simple version of the STREAM benchmark that uses stanzas: unit-stride triads are performed for a set number of locations before jumping in memory.

STriad results show that prefetching engines are sensitive to stanza length and memory bandwidth suffers if stanzas are too small.

StencilProbe: Benchmark & Testbed for Stencil Optimizations

The StencilProbe enables optimization exploration of extracted stencil kernels, while avoiding the large overheads of running entire applications.

Using extracted kernels from Chombo and Cactus, two applications which heavily use stencils, data shows the StencilProbe accurately mimics application performance.
Apex-Map: Memory Access Probe
Apex-Map generates memory references as stochastic variates based on sampling the following random process:

\[ s_i = \frac{M}{L} r_i \]

where \( \alpha \) represents the temporal locality parameter of an application, \( M \) represents the memory footprint of this application, and \( L \) represents the spatial locality parameter of the application.

Assessing the Performance of an Architecture
Performance curve studies

- **Text font hard to read**
- **Good balance between text and graphics**
- **Good color contrast**
- **Organization of poster reflects organization of project, but is the reading order clear?**

Using Apex Map as an Application Proxy
Other parameters are added to the model to capture complex application, such as computational intensity, register pressure, and concurrency level.

The figures below show the that Apex-Map can follow the behavior of CUPS application closely.

Apex-Map

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Access Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random</td>
<td>Random</td>
</tr>
<tr>
<td>Fixed</td>
<td>Fixed</td>
</tr>
<tr>
<td>Stochw</td>
<td>Stochw</td>
</tr>
<tr>
<td>Fixed, affine</td>
<td>Fixed</td>
</tr>
<tr>
<td>Spatial Locality</td>
<td>Spatial</td>
</tr>
<tr>
<td>Temp Locality</td>
<td>Temp</td>
</tr>
<tr>
<td>Reg. Pressure</td>
<td>Reg.</td>
</tr>
<tr>
<td>Comp. Intensity</td>
<td>Comp.</td>
</tr>
<tr>
<td>NUPDATE</td>
<td>NUPDATE</td>
</tr>
</tbody>
</table>

Discovering Prefetch Behavior using Stanza Triad
Based on the memory access pattern of stencil blocked stencils, the Stanza Triad is a simple version of the STREAM benchmark that uses stanzas: unit-stride triads are performed for a set number of locations before jumping in memory.

STriad results show that prefetching engines are sensitive to stanza length and memory bandwidth suffers if stanzas are (and thus stencil cache blocks) are too small.
**Next Gen Sequencing**

- millions of reads
- hard to completely assemble

**Fragmented Assemblies**

- repeat regions difficult to bridge
- uneven read coverage

**Finishing Errors**

1. **human-error**
   - manually joining contigs and trimming sequences can introduce errors

2. **unreproducible**
   - manually editing a sequence can't be repeated by anyone else

3. **hard to change**
   - large blocks of nucleotide sequence are hard to update and determine the source contig

---

**Scaffold**

microbial genome scaffolding software

http://next.gs

Michael D Barton*, Hazel A Barton
Northern Kentucky University

**Scaffold File**

- **sequence**
  - source: 'sequences1'
  - unresolved
  - length: 20

- **sequence**
  - source: 'sequences2'
  - start: 30
  - stop: 1000
  - reverse: true
  - inserts:
    - source: 'insert1'
      - start: 8
      - stop: 160
      - reverse: true
      - open: 200
      - close: 250
    - source: 'insert2'
      - open: 400

**Putative Scaffold**

**Reproduce**

- remove human-error and scaffolds can be reliably reproduced from the same data

**Separate**

- separate sequence from the scaffold organisation and preserve the original assembly data

**Edit**

- easier to edit the scaffold file compared with raw nucleotide sequence

**Visualise**

- provides an overview of the genome construction and allows easier comparisons of differences in scaffolds

---

Michael Barton http://www.bioinformaticszen.com/post/preseting-software-on-a-poster/
- Text font hard to read
- Good balance between text and graphics
- Good color contrast
- Organization of poster reflects organization of project, but is the reading order clear?

Michael Barton http://www.bioinformaticszen.com/post/preseting-software-on-a-poster/
Attributions are a causal mechanism linking performance to feedback.
Attributions are a causal mechanism linking performance to feedback.

- “Mike Morrison” format
  https://twitter.com/mikemorrison/status/1110191245035479041
- https://www.youtube.com/watch?v=1RwJbhkCA58

https://twitter.com/CortRudolph/status/1110605730980212737