CPU performance analysis for MySQL using Hot/Cold Flame Graphs

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About Percona

- Founded in 2006
- 190+ staff worldwide
- Percona blog has 100k+ readers per month
- Percona tools have been used over a billion times in the past 3 years
- Percona conferences attract thousands of attendees from some of the world’s largest companies (#PerconaLive)
- Percona software is installed on millions of servers
About me

- Support Engineer at Percona since 2017.
- Working with MySQL for over six years.
- Working with databases for over nine years.
- Speaker at global conferences and meetups about MySQL/MongoDB.
- Social media
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So Brendan

Or "What are FlameGraphs?"
What are FlameGraphs

Flame graphs are a visualization of profiled software, allowing the most frequent code-paths to be identified quickly and accurately

~ Brendan Gregg

http://www.brendangregg.com/FlameGraphs/cpuflamegraphs.html
void GetBook(Book book) {
    a = GetAuthor(book);
    pub = GetPublisher(book);
    p = GetPrints(book).toString();
    printf("%s published by %s [prints: %s]", a, pub, p);
    ...
}

int main() {
    ...
    GetBookList(book);
    ...
}

void GetBookList(Book book) {
    ...
    while (book = GetBook(book);
    ...
}
What are FlameGraphs: code path

Possible call chains
main() -> GetBooksList() -> GetBook() -> GetAuthor()...
main() -> GetBooksList() -> GetBook() -> GetEditorial()...
main() -> GetBooksList() -> GetBook() -> GetPrints()...
What are FlameGraphs: profiling

Captures of metrics of some type for later aggregation.
What are FlameGraphs

# profile it
perf record -a -g -F99 -p $(pgrep -x mysqld) --
sleep 60

# make it machine-readable
perf script > s.out

# graph it!
stackcollapse-perf.pl s.out | flamegraph.pl > s.svg
Cold Graphs
What are ColdGraphs / Off-CPU analysis

Off-CPU analysis is a performance methodology where off-CPU time is measured and studied, along with context such as stack traces.

http://www.brendangregg.com/offcpuanalysis.html
First things First

# RHEL
yum install bcc-tools

# Ubuntu
sudo apt-get install bpfcc-tools linux-headers-$(uname -r)

# Validating
ls -larth /usr/share/bcc/tools/
Profiling

# /usr/share/bcc/tools/offcputime -df -p `pgrep -nx mysqld` 30 > out.stacks
# git clone https://github.com/brendangregg/FlameGraph
# cd FlameGraph
# ./flamegraph.pl --color=io --title="Off-CPU Time Flame Graph" --countname=us < out.stacks > out.svg
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