

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, D.C. 20549

**FORM S-8**  
**REGISTRATION STATEMENT**  
*UNDER*  
*THE SECURITIES ACT OF 1933*

**MERCURY COMPUTER SYSTEMS, INC.**  
(Exact Name of Registrant as Specified in its Charter)

Massachusetts  
(State of Incorporation)

04-2741391  
(I.R.S. Employer Identification Number)

201 Riverneck Road  
Chelmsford, Massachusetts 01824  
(978) 256-1300  
(Address of Principal Executive Offices)

**MERCURY COMPUTER SYSTEMS, INC.**  
**Amended and Restated 2005 Stock Incentive Plan**  
(Full Title of the Plan)

**Gerald M. Haines II**  
**Senior Vice President, Corporate Development,**  
**Chief Legal Officer, and Secretary**  
**Mercury Computer Systems, Inc.**  
201 Riverneck Road  
Chelmsford, Massachusetts 01824  
(978) 256-1300  
(Name, Address and Telephone Number, Including Area Code, of Agent for Service)

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer

Accelerated filer

Non-accelerated filer  (Do not check if a smaller reporting company)

Smaller reporting company

**CALCULATION OF REGISTRATION FEE**

<b>Title of Securities to be Registered</b>	<b>Amount to be Registered(1)(2)(3)</b>	<b>Proposed Maximum Offering Price Per Share(4)</b>	<b>Proposed Maximum Aggregate Offering Price(4)</b>	<b>Amount of Registration Fee</b>
Common Stock	1,077,680	\$18.87	\$20,335,821	\$2,361.00

- (1) 77,680 shares of the registrant's common stock listed were part of the shares previously registered by the registrant on Form S-8 (File No. 333-101993 filed on December 19, 2002) in connection with the registrant's 1997 Stock Option Plan, as amended. Includes an additional 1,000,000 shares of the registrant's common stock that were not previously registered.
- (2) This registration statement also covers preferred stock purchase rights (the "Rights") which are presently attached to and trade with the registrant's common stock. Any value attributable to the Rights is reflected in the market price of the common stock.
- (3) In addition, pursuant to Rule 416(a) under the Securities Act of 1933, as amended (the "Securities Act"), this registration statement also covers an indeterminate number of additional shares of common stock to be offered or sold as a result of the anti-dilution provisions of the employee benefit plan described herein, including to prevent dilution resulting from any reorganization, recapitalization, reclassification, stock dividend, stock split, or other similar change.
- (4) Calculated in accordance with Rule 457(c) and (h) under the Securities Act solely for the purpose of determining the amount of the registration fee, based on the average of the high and low prices on the NASDAQ Global Select Market on March 7, 2011.

## EXPLANATORY NOTE

This registration statement is being filed solely for the purpose of registering 1,077,680 additional shares of common stock, par value \$0.01 per share (“Common Stock”), of Mercury Computer Systems, Inc. (the “Company”) to be offered to participants under the Company’s Amended and Restated 2005 Stock Incentive Plan (the “2005 Plan”), originally adopted in 2005. The number of shares of Common Stock reserved and available for issuance under the 2005 Plan includes 7,812,045 shares which were previously registered with the Securities and Exchange Commission (the “Commission”) on Form S-8 (File Nos. 333-129929 filed on November 23, 2005, 333-139019 filed on November 30, 2006, 333-149046 filed on February 4, 2008, 333-156364 filed on December 19, 2008, and 333-163705 filed on December 14, 2009) (collectively, the “Prior Registration Statement”), plus the number of shares underlying any grants previously made under the Company’s 1997 Stock Option Plan, as amended (the “1997 Plan”) that are forfeited, canceled, or are terminated (other than by exercise) from and after the effective date of the 2005 Plan. An aggregate of 77,680 additional shares have been included in the shares reserved for issuance under the 2005 Plan as a result of the forfeiture, cancellation, or termination (other than by exercise) of grants previously made under the 1997 Plan. This registration statement also covers the registration of 1,000,000 shares of Common Stock added to the 2005 Plan in connection with its amendment and restatement, which was approved by the Company’s shareholders on October 21, 2010.

Pursuant to General Instruction E of Form S-8, the contents of the Prior Registration Statement are incorporated herein by reference, except as otherwise noted below.

## PART II

### INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

#### ITEM 3. INCORPORATION OF DOCUMENTS BY REFERENCE.

The following documents are incorporated herein by reference:

- (a) The Company’s annual report on Form 10-K for the fiscal year ended June 30, 2010, as filed with the Commission on August 19, 2010;
- (b) The Company’s quarterly report on Form 10-Q for the fiscal quarter ended September 30, 2010, as filed with the Commission on November 4, 2010;
- (c) The Company’s quarterly report on Form 10-Q for the fiscal quarter ended December 31, 2010, as filed with the Commission on February 3, 2011;
- (d) The Company’s current reports on Form 8-K filed with the Commission on July 15, 2010, August 10, 2010, September 14, 2010, October 22, 2010, January 12, 2011, February 11, 2011, and February 16, 2011;
- (e) The description of the Company’s Common Stock contained in the Company’s registration statement on Form 8-A dated January 7, 1998, as filed with the Commission pursuant to Section 12 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), including any amendment thereto or report filed for the purpose of updating such description; and
- (f) The description of the Company’s preferred stock purchase rights contained in the Company’s registration statement on Form 8-A dated December 15, 2005, as filed with the Commission pursuant to Section 12 of the Exchange Act, including any amendment thereto or report filed for the purpose of updating such description.

All documents subsequently filed by the Company pursuant to Sections 13(a), 13(c), 14, and

15(d) of the Exchange Act, prior to the filing of a post-effective amendment which indicates that all securities offered hereby have been sold or that deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference herein and to be a part hereof from the date of the filing of such documents.

#### **ITEM 5. INTERESTS OF NAMED EXPERTS AND COUNSEL**

The validity of the Common Stock offered under this registration statement will be passed upon for the Company by Bingham McCutchen LLP, Boston, Massachusetts. Bingham McCutchen LLP does not have a substantial interest, direct or indirect, in the Company.

#### **ITEM 8. EXHIBITS.**

Exhibit	Description
4.1	Articles of Organization (incorporated herein by reference to Exhibit 3.1 of the Company's annual report on Form 10-K for the fiscal year ended June 30, 2009).
4.2	Articles of Amendment (incorporated herein by reference to Exhibit 3.2 of the Company's annual report on Form 10-K for the fiscal year ended June 30, 2010).
4.3	Articles of Amendment (incorporated herein by reference to Exhibit 1 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
4.4	By-laws, as amended through September 22, 2004 (incorporated herein by reference to Exhibit 4.4 of the Company's registration statement on Form S-8, as filed with the Commission on December 14, 2009).
4.5	Amendment to By-laws dated December 17, 2007 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on December 20, 2007).
4.6	Amendment to By-laws dated January 21, 2008 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on January 24, 2008).
4.7	Amendment to By-laws dated September 14, 2009 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on September 14, 2009).
4.8	Shareholder Rights Agreement, dated as of December 14, 2005, between the Company and Computershare Trust Company, N.A. (formerly known as EquiServe Trust Company, N.A.) (incorporated herein by reference to Exhibit 2 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
4.9	Mercury Computer Systems, Inc. Amended and Restated 2005 Stock Incentive Plan (incorporated herein by reference to Appendix A of the Company's Definitive Proxy Statement filed with the Commission on September 20, 2010).
5.1*	Opinion of Bingham McCutchen LLP.
23.1*	Consent of KPMG LLP.
23.2	Consent of Bingham McCutchen LLP (contained in the opinion filed as Exhibit 5.1 to this registration statement).
24.1	Power of Attorney (included in signature page to this registration statement).
*	Filed herewith.

## SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the town of Chelmsford, the Commonwealth of Massachusetts on this 11th day of March, 2011.

MERCURY COMPUTER SYSTEMS, INC.

By: Gerald M. Haines II  
Gerald M. Haines II  
Senior Vice President, Corporate Development, Chief  
Legal Officer, and Secretary

### Power of Attorney

KNOW ALL MEN BY THESE PRESENTS that each person whose signature appears below constitutes and appoints Mark Aslett, Robert E. Hult, and Gerald M. Haines II his true and lawful attorneys-in-fact and agents, each acting alone, with full powers of substitution and resubstitution, for him or in his name, place and stead, in any and all capacities to sign any and all amendments or post-effective amendments to this registration statement (or any registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, each acting alone, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, each acting alone, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ Mark Aslett</u> Mark Aslett	President, Chief Executive Officer, and Director (Principal Executive Officer)	March 11, 2011
<u>/s/ Robert E. Hult</u> Robert E. Hult	Senior Vice President, Chief Financial Officer, and Treasurer (Principal Financial Officer)	March 11, 2011
<u>/s/ Charles A. Speicher</u> Charles A. Speicher	Vice President, Controller, and Chief Accounting Officer (Principal Accounting Officer)	March 11, 2011
<u>/s/ Vincent Vitto</u> Vincent Vitto	Chairman of the Board of Directors	March 11, 2011
<u>/s/ James K. Bass</u> James K. Bass	Director	March 11, 2011
<u>/s/ George W. Chamillard</u> George W. Chamillard	Director	March 11, 2011

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<u>/s/ Michael A. Daniels</u> Michael A. Daniels	Director	March 11, 2011
<u>/s/ George K. Muellner</u> George K. Muellner	Director	March 11, 2011
<u>/s/ William K. O'Brien</u> William K. O'Brien	Director	March 11, 2011
<u>/s/ Lee C. Steele</u> Lee C. Steele	Director	March 11, 2011

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*	Filed herewith.

[Letterhead of Bingham McCutchen LLP]

March 11, 2011

Mercury Computer Systems, Inc.  
201 Riverneck Road  
Chelmsford, Massachusetts 01824

**Re: Registration Statement on Form S-8**

Ladies and Gentlemen:

This opinion is furnished in connection with the registration, pursuant to a Registration Statement on Form S-8 under the Securities Act of 1933, as amended (the "Securities Act"), to be filed with the Securities and Exchange Commission on or about March 11, 2011 (the "Registration Statement"), of an aggregate of 1,077,680 shares (the "Shares") of common stock, par value \$0.01 per share (the "Common Stock"), of Mercury Computer Systems, Inc., a Massachusetts corporation (the "Company"), which are or will be issuable to officers, employees, non-employee directors and consultants of the Company and its subsidiaries upon the exercise of options granted pursuant to the Company's Amended and Restated 2005 Stock Incentive Plan (the "2005 Plan") or which the Company may issue pursuant to awards of stock appreciation rights, restricted stock or deferred stock under the 2005 Plan.

We have acted as counsel to the Company in connection with the foregoing registration of the Shares. We have examined and relied upon originals or copies of such records, instruments, certificates, memoranda, and other documents as we have deemed necessary or advisable for purposes of this opinion and have assumed, without independent inquiry, the accuracy of those documents. In that examination, we have assumed the genuineness of all signatures, the conformity to the originals of all documents reviewed by us as copies, the authenticity and completeness of all original documents reviewed by us in original or copy form, and the legal competence of each individual executing such documents. We have further assumed that all options granted or to be granted pursuant to the 2005 Plan were or will be validly granted in accordance with the terms of the 2005 Plan, that all Shares to be issued upon exercise of such options will be issued in accordance with the terms of such options and the 2005 Plan, and that all Shares sold or granted as a stock appreciation right, restricted stock award or deferred stock award will be sold or granted in accordance with the terms of the 2005 Plan.

This opinion is limited solely to the substantive laws of the Commonwealth of Massachusetts.

Based upon and subject to the foregoing, we are of the opinion that upon the issuance and the delivery of the Shares in accordance with the terms of the 2005 Plan, the Shares will be validly issued, fully paid, and nonassessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the Registration Statement. In giving our consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations thereunder.

Very truly yours,

/S/ BINGHAM MCCUTCHEN LLP

BINGHAM MCCUTCHEN LLP



## Consent of Independent Registered Public Accounting Firm

The Board of Directors  
Mercury Computer Systems, Inc.:

We consent to the use of our report dated August 19, 2010, with respect to the consolidated balance sheets of Mercury Computer Systems, Inc. and subsidiaries as of June 30, 2010 and 2009, and the related consolidated statements of operations, shareholders' equity and comprehensive income (loss), and cash flows for each of the years in the three-year period ended June 30, 2010, the related financial statement schedule, and the effectiveness of internal control over financial reporting as of June 30, 2010, incorporated herein by reference.

Our report refers to the Company's change in its method of accounting for revenue arrangements with multiple-deliverables entered into or substantially modified after July 1, 2009 to adopt FASB ASU No. 2009-13, *Multiple-Deliverable Revenue Arrangements*.

/s/ KPMG LLP

Boston, Massachusetts  
March 11, 2011